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Land Use Element Technical Report




**LAND USE ELEMENT
TECHNICAL REPORT**

December, 1987

**City of Orange
General Plan**

#477



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1.0 INTRODUCTION

The land use element has the broadest scope of the seven mandatory general plan elements. The element must describe the distribution, extent and general location of land use in the City as well as the population density and building intensity of the land use districts. Also, the element must identify lands subject to flooding and designated timber-lands. (Office of Planning and Research, page 81)

Because the element addresses a wide range of issues, the subject matter necessarily overlaps that covered by the other elements and related technical reports. For example, both the land use and conservation elements inventory mineral and agriculture resources, and flood hazards must be identified in both the safety and land use elements. The land use element serves to coordinate land use policy and discusses how environmental resources and constraints influence land use decisions.

The focus of this technical report is to describe existing land use conditions, land use plans, land use trends and land use constraints. Special attention has been focused on existing residential development, the continued revitalization of commercial corridors and centers, the gradual change in use in the industrial sectors of the City and the new development occurring in the hillsides.

By highlighting existing land use and land use trends, the technical report provides a framework around which the City can construct land use goals and policies.

2.0 EXISTING LAND USE

The incorporated City limits encompass approximately 14,140 acres, or 22 square miles of land (September 1987). Thirty-six (36) percent of the land is devoted to residential uses, while 14 percent is covered by freeways, local streets and other rights-of-way. Table LU-1 provides a summary of the land use distribution in Orange as of September, 1987.

TABLE LU-1
EXISTING LAND USE - SEPTEMBER 1987

Land Use	Acreage	Percentage of City Total
1. Residential		
a. Single Family	4,427	31
b. Two Family	204	1
c. Multiple Family	602	4
2. Commercial		
a. Professional	248	2
b. General	677	5
3. Industrial	757	5
4. Institutional	815	8
5. Mineral Resource	356	2
6. Agriculture	703	5
7. Circulation	2,015	14
8. Public Open Space	166	1
9. Private Open Space	692	5
10. Santiago Creek	69	0.5
11. Santa Ana River	112	1
12. Southern California Edison	232	1.5
13. Vacant	2,065	14
TOTAL	14,140	100 %

Residential Land Use

Residential land use may be described in terms of the type and intensity of development. In Orange, the three types of residential development include single family homes, two family units (commonly referred to as duplexes) and multiple family units. Apartments, condominiums and townhouses are all considered multiple family units.

Development intensity describes unit density, or the number of dwelling units per acre. In Orange, residential densities range from a low of one unit per gross acre for hillside and equestrian estate developments up to 60 units per acre in high density senior citizen housing projects. Most higher density developments (apartments, condominiums) average 20 to 24 units per acre.

As indicated in Table LU-1 and as shown on Figure LU-1, residential development covers 36 percent of the developed land area in Orange. The diverse mix of housing types and styles represent ten decades of residential development which began with the incorporation of Orange in 1888. The City's growth and pattern of development is evident from the architectural styles of the houses Citywide. The oldest homes lie within the City's Old Towne district, an area bounded generally by Walnut Avenue, Cambridge Street, La Veta Street and Batavia Avenue. North of Old Towne, west of the Costa Mesa Freeway, are single family subdivisions and apartment buildings built during the 1940s and 1950s. In the 1960s, lands east of the freeway experienced extensive development, evidenced by the large single family subdivisions extending from Lincoln Avenue south to the City limits and east toward Santiago Boulevard. The hillside development primarily represents building activity which occurred in the 1970s and is continuing in the 1980s.

Single Family Development: Single family subdivisions have been developed throughout the City at a range of densities. The smallest allowable lot size is 6,000 square feet, which yields a density of 5.4 units per net acre. Within the Old Towne district and in single family neighborhoods located south of Katella Avenue and west of Tustin Street, most subdivisions have been developed at or near 5.4 units per net acre. These represent the

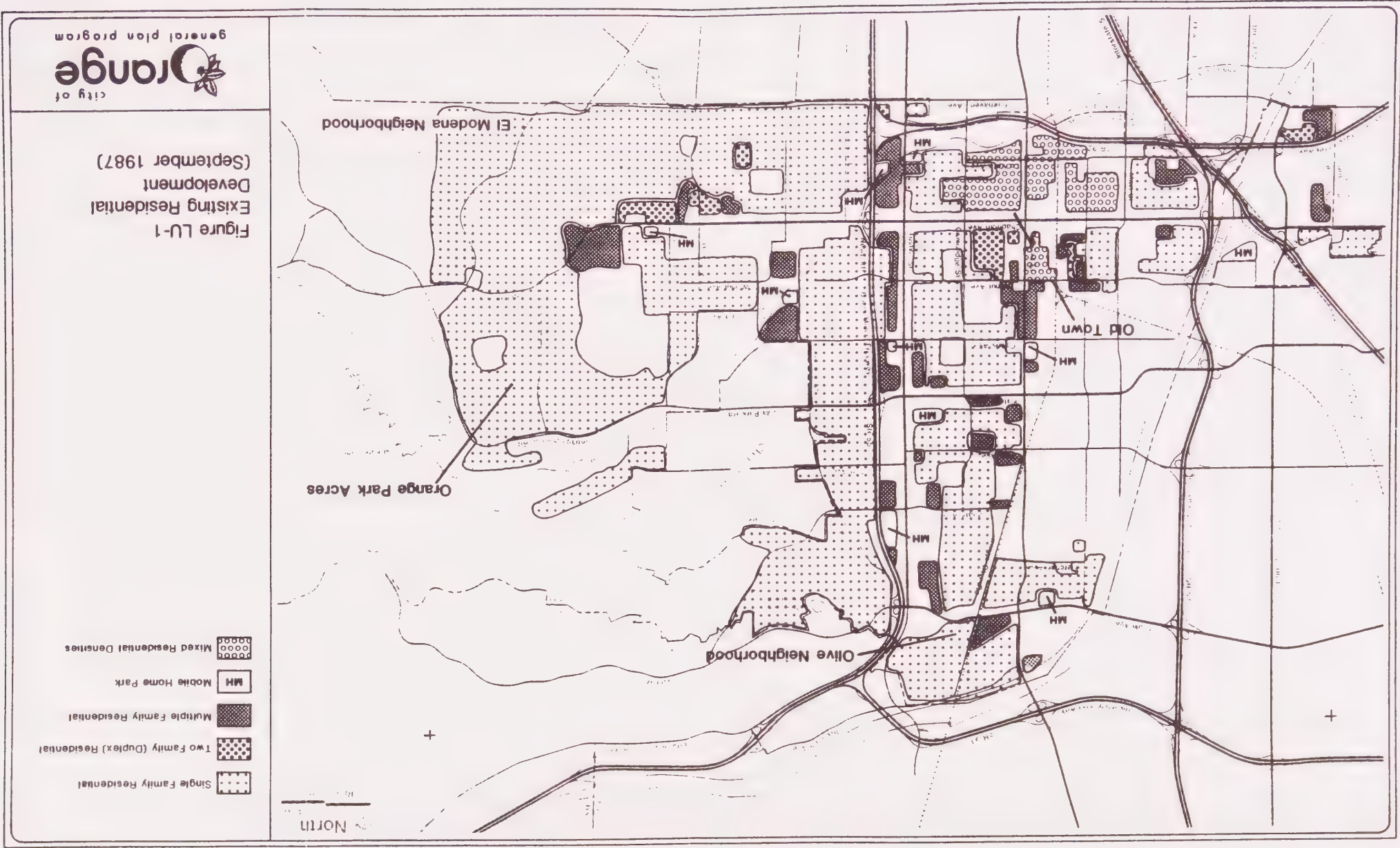
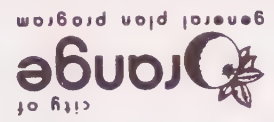


Figure LU-1
Existing Residential
Development
(September 1987)



City's oldest single family residential developments.

In Old Towne, many lots with one existing unit actually are zoned for duplex and multiple family development. Some lots have recycled to the allowable higher density, creating neighborhood sub-units with a mix of single family, two family and multiple family development. The mix is particularly apparent in the Cypress neighborhood. This neighborhood contains legally constructed second units on the small lots as well as nonconforming units. The Cypress neighborhood displays signs of overcrowding.

The single family neighborhoods north of Katella Avenue and west of the Costa Mesa Freeway were built during the 1950s and 1960s. Between Katella and Taft Avenues, the lots have a minimum size of 7,000 square feet (4.6 units per net acre). These subdivisions transition to slightly larger lots (8,000 square feet and 4.1 units per acre) north of Taft Avenue. A newer development located in the northwest corner of the City, west of the railroad tracks has been developed with 7,000 square foot lots. In general, the single family neighborhoods north of Katella Avenue appear stable and relatively well maintained.

Included in the northwest section of the City is a small island of unincorporated County land developed with single family homes dating to the early 1900s. This neighborhood, the Olive neighborhood, contains several structures which the Orange County Historical Society has identified as historically significant.

The El Modena neighborhood, located east of the Costa Mesa Freeway (Figure LU-1) may also be considered historically significant. During the 1920s and 1930s, the homes were built to house farmworkers and their families. About 75 of the original homes remain today.

Most single family development in the east Orange area reflects the building boom period of the 1960s and 1970s. Neighborhood densities on level topography range from 4.1 to 5.4 units per acre, and the hillside subdivisions generally display a minimum lot size of 8,000 square feet (4.1 units per acre), although actual densities vary according

to local topographic constraints. Both the hillside developments and the subdivisions located below the hills appear to be very stable, traditional single family neighborhoods.

The hills also contain larger, equestrian oriented developments such as Orange Park Acres, a partially unincorporated neighborhood surrounded on all sides by the City (Figure LU-1). Lots adjacent to Orange Park Acres, south and west of Santiago Canyon Road, are zoned for densities of one to four units per gross acre. Existing development reflects the City's rural past with large areas supporting fruit orchards associated with the residential development. Increasingly, however, newer large lot development consists of one acre lot subdivisions rather than the multi-acre "ranchette" properties of the past.

Duplex Development: Duplex development is concentrated in several areas throughout the City with the largest concentrations occurring in Old Towne and the El Modena area.

In Old Towne, many properties are zoned for duplex and multiple family development, but only one unit has been constructed on the lot. In the past, such neighborhoods remained predominately single family despite these zoning designations. Within recent years, however, increased demand for affordable housing has encouraged many property owners to construct additional units on the lots.

The duplex development in the El Modena area represents the interest of the neighborhood community to remain primarily single family in character while permitting smaller second units on a lot.

Multiple-Family Developments: Apartments, condominiums and townhouses are all considered multiple-family residential units. In Orange, such developments generally do not exceed a density of 20 units per acre, although a number of senior citizen housing projects have been constructed at densities ranging from 50 to 60 units per acre.

In general, apartment development in Orange consists of two-story buildings with surface parking and some outdoor recreation amenities. Such development are

distributed throughout the City in no discernable pattern. As might be expected, the older units lie in the western half of the City. In some areas surrounding Old Towne, the older buildings display signs of limited maintenance.

Condominiums and townhomes represent a relatively new type of development in Orange. Major developments are located on the north side of Chapman Avenue just below the hills. Similar developments are scattered throughout the community, often located adjacent to commercial development, where the condominiums serve as a transition between commercial businesses and more traditional single family uses. These developments are largely owner-occupied, offering a less expensive form of owner-occupied housing than the detached single-family unit.

A housing study prepared by City Planning staff in 1987 indicates an increasing trend toward multiple-family development, especially condominiums. (Housing Element, page 11) Much of the new development results from the recycling of underutilized, low density residential units to densities consistent with underlying zoning. The trend may continue in older neighborhoods where single-family or duplex units are not well maintained.

Mobile Homes: Mobile homes in mobile home parks are considered a form of single-family residential housing. Mobile home park densities, however, more closely approximate the densities of duplex development. Orange mobile home park zoning regulations permit 10 mobile homes per acre.

As required by State law, mobile homes may be erected in any residential zone consistent with underlying zone provisions. However, by allowing 10 units per acre, the City's mobile home zone serves as an incentive to concentrate the uses in mobile home parks. Several mobile home parks exist in Orange. The mobile home zone demonstrates the City's intent to preserve developments of manufactured housing as an affordable type of housing. This is important in light of the fact that throughout the City and throughout the urban areas of Southern California, intense pressure exists to recycle mobile home parks to higher density developments.

Commercial Land Use

Orange benefits from a diverse commercial land use mix which includes three major retail shopping centers, two primary retail/service commercial corridors and a developing high-rise business center. Retail and service commercial uses account for five percent of the land area in the City. About two percent of the uses consist of office/professional development.

Shopping Centers: The two regional malls within the City are The City shopping center and the Mall of Orange. These malls are large, enclosed centers containing anchor retail stores and the variety of smaller retail shops and service businesses typically found in such developments.

The City shopping center lies west of the Santa Ana River channel in an area highly visible from the Orange, Santa Ana and Garden Grove freeways. Despite the City's proximity to these major transportation routes, access to the center is difficult. Because of its location, the center readily serves residents of Anaheim, Santa Ana and Garden Grove as well as Orange. In the past, access problems may have contributed to the center's limited use.

Within the last five years, however, the area surrounding the 620,000 square foot retail center has experienced increasing high-rise office development which has served to attract other new business to the area. Restaurants and other support service businesses catering to existing retail uses and newer business office development have been established within the mall and on adjacent properties.

The Mall of Orange, located on Tustin Street just south of Heim Avenue, provides more traditional retail shopping facilities, including Sears, J.C. Penney and Broadway department stores. Although the Mall lies within a redevelopment project area, redevelopment efforts have not focused on mall improvements. The Mall contains many economically viable commercial uses benefitting local neighborhoods and the Orange community as a whole. However, exterior improvements and a change in the mix of uses could serve to attract more people to the center.

The Town and Country Center is located south of the Garden Grove Freeway, near the older high-rise office development in Orange and the developing business office center in Santa Ana

(Figure LU-2). Consequently, the center's specialty shops and restaurants cater to the local business population in addition to Orange residents. Although the shopping center has not expanded since its original development, ongoing intensification of commercial and office uses along Main Street may encourage increased use of the Town and Country Center as either a commercial or professional office development.

Recent commercial activity in the area includes a major expansion of the Santa Ana Fashion Square, located in the City of Santa Ana directly across Main Street from Town and Country, as well as intensive high-rise office development along the Garden Grove Freeway corridor.

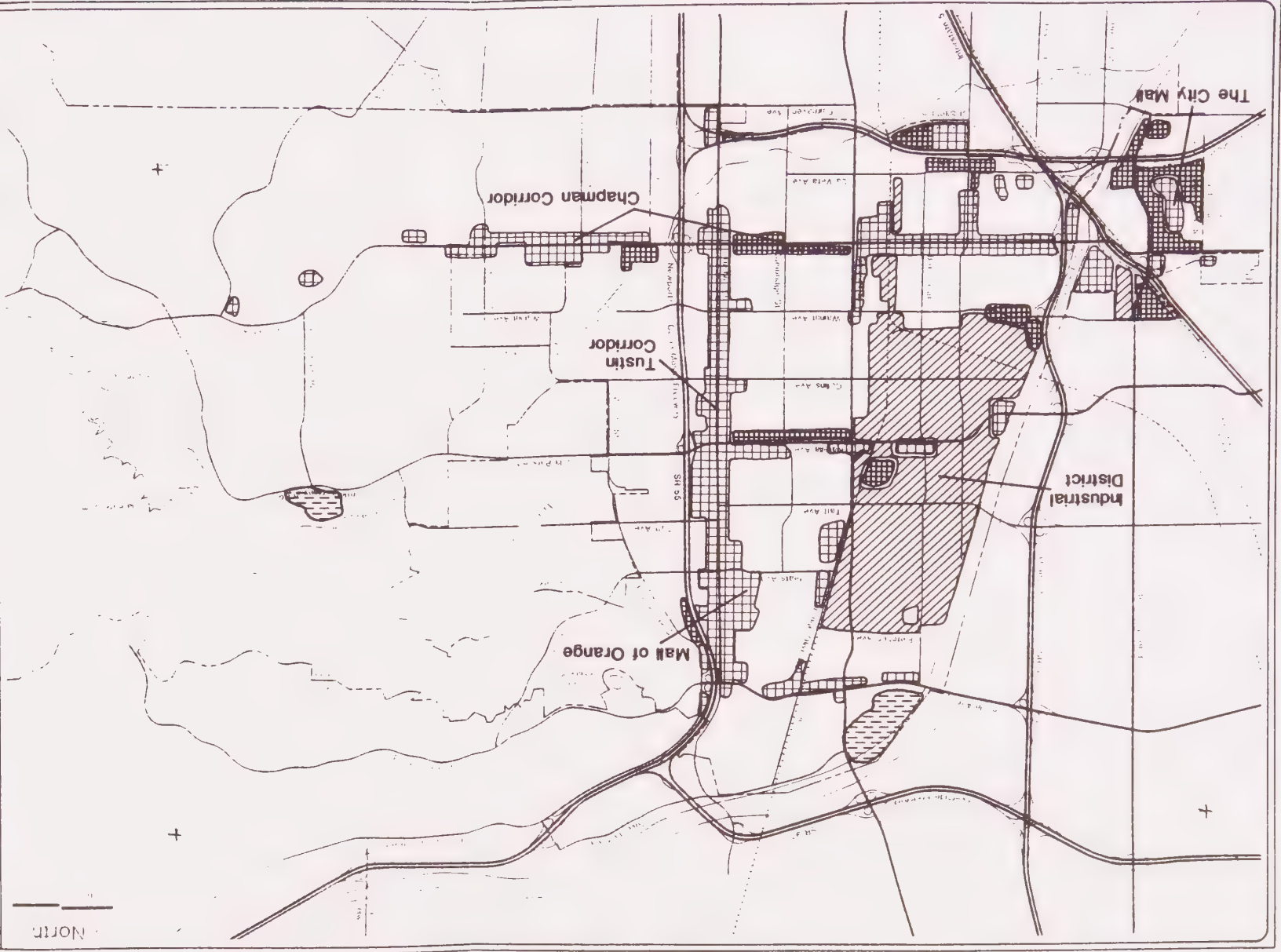
Commercial Corridors: Tustin Street and Chapman Avenue serve as the City's two major commercial corridors, supporting a range of retail and service commercial as well as low-rise office uses. Katella Avenue between Glassell Street and the Costa Mesa Freeway serves as a minor commercial corridor.

The Tustin Street corridor extends the length of the City, from Santa Ana Canyon Road south to the Garden Grove Freeway. Development consists of scattered mini-malls, small shopping centers, drive-through restaurants and stand alone office buildings and retail commercial establishments. The development pattern and range of uses may be described as typical strip commercial. Tustin Avenue has developed and redeveloped over the years without the benefit of a master plan or other mechanism designed to encourage integrated land use and architectural planning. However, in 1983, the City established a redevelopment plan for Tustin Street to encourage economic and aesthetic revitalization of the strip (Figure LU-2). Redevelopment efforts have resulted in improvements to smaller shopping centers.

The Chapman Avenue commercial corridor, divided by the Costa Mesa Freeway, consists of two characteristically distinct zones. West of the freeway the corridor passes through Old Towne, where many commercial establishments occupy buildings dating to the late 1800s and the early part of this century. Existing uses include unique retail shops and office buildings which serve the surrounding residential neighborhoods and the general community.

Figure LU-2
Existing Commercial and
Industrial Development
(September 1987)

- General Commercial
- Professional Office
- Industrial
- Aggregate Processing



In Old Towne, many of these businesses occupy converted and renovated Victorian and Craftsman style houses.

City Hall and the Plaza Historic District lie along Chapman Avenue near Glassell Street. Farther west along Chapman Avenue, outside of the Old Towne boundaries, development consists of mixed commercial and light industrial uses such as automobile repair shops, equipment rental outlets and small manufacturing operations. Many of the facilities built during the 1940s and '50s display signs of age and wear.

East of the Costa Mesa Freeway, Chapman Avenue supports newer commercial development constructed within the last 25 years. Predominate uses include retail and food stores and restaurants (especially fast-food restaurants) interspersed with small office buildings and in some places, multiple family residential developments. In general, these businesses serve the local population in the east Orange area and north Tustin. This section of the Chapman Avenue commercial corridor is relatively well maintained and appears in generally sound economic condition.

Minor commercial corridors include: Katella Avenue from Glassell Street east to the Costa Mesa Freeway and Orange-Olive Road between Taft and Glendora Avenues. Katella Avenue supports a mix of office, retail/service and light industrial/wholesale outlet developments which appear well-used. Along Orange-Olive Avenue are older, small retail/service centers which appear aged and underutilized. Commercial uses may no longer be viable along Orange-Olive, and the land might be better used for low to medium density residential development similar to that existing to the south and east.

Office Development: For the purpose of land use classification, office development is considered a commercial use. Oftentimes retail and service commercial uses are located within or adjacent to office buildings, serving support functions.

As described above, both Tustin Street and Chapman Avenue support scattered low-rise office development. A greater intensity of office buildings lie along Katella Avenue. High-rise office development is concentrated in two areas: 1) along Main Street, north and south of the Garden Grove Freeway; and 2) west of the Santa Ana River around The City shopping center.

The Main Street high-rise core contains some of Orange's oldest and newest office buildings. The older buildings rise 12 stories along Main Street. Newer buildings with 15 to 20 have developed along La Veta Avenue and behind the Town and Country shopping center. Included in the La Veta Avenue development are two major high-rise medical facilities - Saint Joseph's Hospital and the Children's Hospital of Orange County (CHOC).

More intensive high-rise development has occurred around The City shopping center in west Orange (Figure LU-2). Within the past five years, land west of the Santa Ana River has experienced tremendous growth, including the construction of a 15-story major hotel and over two million square feet of office space. A single company owns the properties surrounding The City shopping center, and the company's master plan calls for the continued development of office buildings in this area. High-rise offices are to be constructed near the center of the site, while more modest structures (three to five stories) will lie around the periphery.

The recent office boom in Orange has paralleled similar growth trends in the neighboring cities of Anaheim and Santa Ana. This tri-city area rapidly is becoming the center for office-related employment in Central Orange County. Factors contributing to this phenomenon include superior highway access, cheaper land costs and lower rental rates than are available in Southern Orange County, and a large labor pool. Studies prepared for the City of Orange Redevelopment Agency state that recent (1987) net absorption of office space approaches 550,000 square feet per year, and the trend is expected to continue. (Reference 3, page 3)

The demand for office space has led to the development of numerous low profile office buildings in the City's industrial district. Existing zoning regulations permit the establishment of some commercial uses in industrial zones. Although many of the new buildings provide office space for related industrial uses, an increasing number of developments are built for commercial lease purposes.

Industrial Land Uses

The "industrial" land use category includes uses considered to be purely industrial in nature, that is, uses which involve the manufacture, assembly or

warehousing of goods. Businesses such as automobile repair or personal storage (mini-warehouse) may have some industrial characteristics, but these uses provide more service commercial functions and therefore are not included in the industrial category.

Industrial development accounts for approximately five percent (757 acres) of the City's total land area. Almost all of the uses are concentrated in an industrial district bounded generally by the Santa Ana River, Fletcher Avenue, Glassell Street and Walnut Avenue. The industrial district benefits from ready access to the regional freeway and arterial street network and a series of railway spur lines (Figure LU-2).

Although the industrial district boundaries encompass approximately 1,500 gross acres of land area, only about 757 acres actually support industrial uses. Twenty-five (25) to 30 percent of the land area is devoted to public right-of-way use (streets, railroads, drainage easements), and small commercial developments lie scattered throughout the district.

In the past, the City's industrial businesses consisted largely of medium and heavy manufacturing operations such as concrete batch plants, sheet metal fabrication facilities and machine parts manufacturing. Lighter industrial uses and some commercial businesses were scattered throughout the district. However, since the mid-1970s, the district has supported a wider range and mix of industrial and commercial uses. Lighter, cleaner manufacturing and distribution uses have replaced the heavier, more labor-intensive businesses. Along Katella Avenue and in smaller pockets throughout the district, many of the manufacturing plants contain wholesale or retail outlets for the distribution of goods manufactured onsite.

Taft Avenue and the high visibility corner of Orangewood Avenue and the Orange Freeway have experienced extensive office development. Some of it is related to adjacent industrial uses, but many buildings have been constructed to meet the demand for office space for non-industrial businesses.

It is anticipated that high technology, small scale industries and commercial uses will continue to

replace the older, heavier industrial operations throughout the district.

Institutional Land Uses

Major institutional uses in Orange include Chapman College, the University of California, Irvine (UCI) medical center and the Orange County criminal justice center and surrounding county administration uses. Orange also contains 21 operating public school facilities as well as several private schools. The Orange Unified School District also owns several closed school sites in the City. Public open space (parks, trails) are not included in the institutional category. In all, institutional uses account for eight percent, or 815 acres of the City's total land area. City parks, churches, hospitals and public buildings such as libraries and fire stations are included in this total.

Chapman College: Chapman College encompasses approximately 74 acres of land within the Old Towne district. The campus covers several contiguous blocks of property surrounded by single family residential neighborhoods. Classroom facilities are bounded by Palm Avenue, Walnut Avenue, Glassell Street and Center Street. College dormitories occupy the City blocks bounded by Grand Street, Everet Place, Shaffer Street and Walnut Avenue.

UCI Medical Center: UCI Medical Center, which lies adjacent to the Santa Ana Freeway and fronts on The City Drive, is an important research and patient care facility which serves residents throughout Orange County. The Center itself consists of several high-rise medical buildings surrounded by landscaped grounds and expansive parking lots. Related medical research and office uses have developed around the medical center.

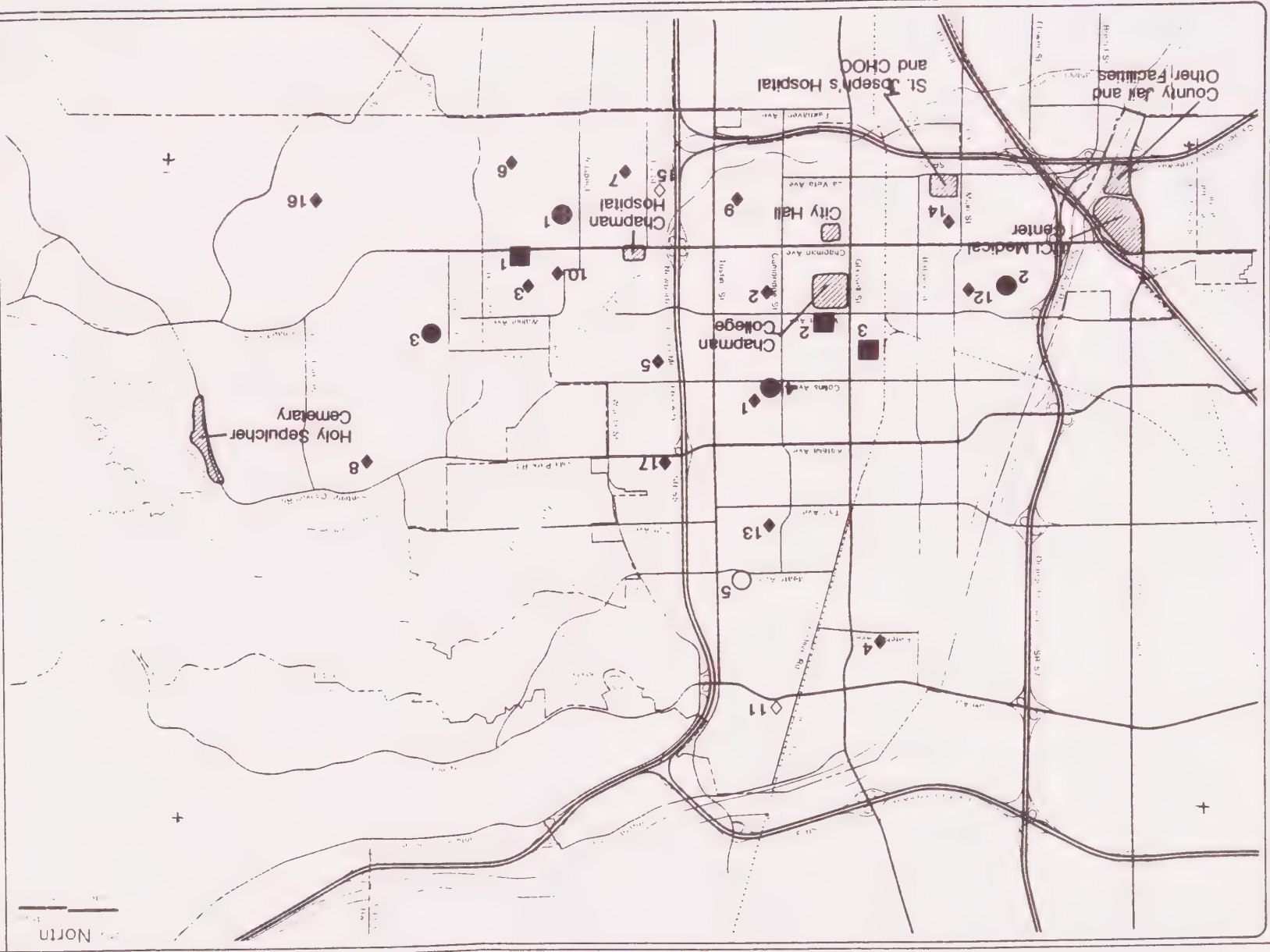
County Facilities: The County jail lies immediately south of the UCI facility. The jail and other County facilities serving the area are grouped together on a 70 acre parcel. These County facilities include: the dog pound, a library, a County hospital, a communications building and juvenile hall.

Public Schools: The Orange Unified School District (OUSD) operates 21 schools within the City of Orange and owns additional facilities which are used for



Figure LU-3
Major Institutional
Land Uses
(September 1987)

- Elementary Schools
- ◆ Open
 - ◇ Closed
- Junior High Schools
- Open
 - Closed
- High Schools
-
1. California
2. Cambridge
3. Esplanade
4. Fletcher
5. Handy
6. Jordan
7. La Vista
8. Linda Vista
9. Palmyra
10. Prospect
11. Olive
12. Sycamore
13. Tall
14. West Orange
15. Parkside
16. Panorama
17. Kaitella
1. McPherson
2. Portola
3. Santiago
4. Yorba
5. Palatka
1. El Modena
2. Orange
3. Richland Continuation



special education programs or have been closed and are presently vacant. Figure LU-3 indicates the location of the District's facilities.

Fourteen of the schools are elementary schools which are located through the City, serving specific neighborhood areas. In recent years, the percentage of Orange residents in these schools has declined as the District has transferred students from faster growing areas of Anaheim and Garden Grove into Orange elementary schools.

Four junior high schools, two senior high and a continuation senior high school lie in Orange. The District also operates a career center at a former elementary school site at 250 South Yorba Street. Other closed school sites, such as Peralta Junior High, are not used by the District for any purpose.

City Facilities: City facilities in the "Institutional" land use category include public parks, City Hall, all seven fire stations, City vehicle maintenance yards and other minor uses. Some of these uses are shown on Figure LU-3.

Mineral Resource Areas

Both the Santa Ana River channel and Santiago Creek contain aggregate materials (sand, gravel, rocks) suitable for the production of Portland Cement and similar concrete products. The California Division of Mines and Geology (CDMG) considers portions of these resource zones to be of regional significance, as defined in CDMG's publication "Mineral Land Classification of the Greater Los Angeles Area." CDMG resource maps designate the river, the creek and lands surrounding these watercourses as "Mineral Resource Zones" (MRZ-2). Within these zones are three areas defined to be "Regionally Significant Aggregate Resource Areas." Resource zone boundaries and the significance of the "Regionally Significant" designation are described in greater detail in the Open Space and Conservation Element Technical Report.

The CDMG's position with regard to Regionally Significant Aggregate Resource Areas is that jurisdictional land use plans (e.g. the Orange General Plan) should recognize the regional importance of the resource deposits and the need to preserve resource areas for later recovery operations.

Figure LU-4 indicates the extent of existing and former mining operations throughout the City. Former mining activities have left distinguishing marks on the landscape. Most notable is the tremendous pit located partially outside of the City limits at Prospect Street and Bond Avenue. Smaller pits and similar scar features are evident along Santiago Creek from its intersection with the Costa Mesa Freeway east toward the City limits.

As indicated in Table LU-1, mineral resource areas encompass 356 acres, or two percent of the City's land area. This total includes lands actively mined as well as former mine sites or lands zoned for sand and gravel recovery operations.

Agriculture Land Uses

Citrus groves, field crops and open range land once covered vast acres of land in the City. However, agricultural operations now account for only 703 acres, or five percent, of the City's total land area. Estimates provided by the Orange County Agricultural Commissioner's office indicate that commercial crops occupy 67 of the 703 acres. The remaining 636 acres include wholesale nursery lots, rangeland, agricultural uses associated with private residences and other minor uses. As of September 1987, none of the agricultural lands lay within agricultural preserves.

Circulation

The City street system and portions of the regional freeway network cover a total of 2,144 acres, or 17 percent of Orange. Major east-west traffic routes include Chapman Avenue, Katella Avenue and Taft Avenue. Only Chapman Avenue provides an easy through link to the eastern edge of the City, although flow is restricted by the traffic circle at Glassell Street.

Primary north-south streets include Main Street, Glassell Street and Tustin Street, all located west of the Costa Mesa Freeway. East of the freeway, the previous lack of development, as well as physical constraints have delayed construction of a major north-south route. The Orange County Transportation Corridor Agency is planning a major north-south arterial through the hills east of the Villa Park diversion basin. This route and other major transportation and circulation issues are discussed in the Circulation Technical Report.

Vacant Lands

As of September 1987, approximately 14 percent (2,065 acres) of the City's land area was vacant. Most of the vacant land lies in the hills to the east, although vacant lots are scattered throughout the urbanized portions of Orange. The vacant land inventory changes constantly as these vacant lots are developed or as the City annexes undeveloped properties.

3.0 LAND USE TRENDS

The City of Orange was founded in the late 1800s as a real estate venture by two lawyers, Andrew Glassell and A. B. Chapman. These gentlemen acquired the land in exchange for legal services and in 1871 subdivided the land into saleable lots. The town was laid out in a typical grid street pattern with the two main streets - Chapman Avenue and Glassell Street - intersecting in the middle of town to form a public plaza. The town's founders envisioned that the plaza area would serve as a focal point for a commercial district, and the surrounding lots would be developed as residential neighborhoods. This original town area is evident today as the Old Towne district.

During the first fifteen years of its existence, Orange did not experience much growth. With the extension of the Santa Fe Railroad line through the City in 1887, however, the real estate market grew, and many merchants opened businesses and built their homes in Orange.

Not until the turn of the century did new land use patterns begin to develop beyond the City's original boundaries. As the citrus industry became increasingly important throughout Orange County, farmers began to cultivate large citrus groves and plant vast acres of field crops north and east of the town. New residential neighborhoods were established to provide housing for farmworkers and their families. Most notably, the El Modena and McPherson areas were developed in what is now east Orange (east of the Costa Mesa Freeway), and the Olive neighborhood was established in north Orange, near the railway line.

Over the next 50 years, the City began to develop out from the central core of Old Towne, toward the outlying residential neighborhoods. During the 1940s and 1950s, the type of residential construction changed from individual houses built on older subdivided lots to new tracts of single-family homes constructed by a single developer. Commercial development tended to be concentrated along Tustin Street and Chapman Avenue. Some agricultural production continued in the western portion of the City between the Santa Ana River and Glassell Street, but agricultural activities were focused in and along the base of the hills east of the urbanized areas.

The early 1960s brought significant changes in the types and extent of land use in Orange. Pressures for residential growth pushed residential development farther east, near and into the foothills. Commercial businesses extended farther down Chapman Avenue to support the new residential development. Later in the 1960s, industrial development began to replace the field crops along the Santa Ana River, and large single-family subdivisions sprang up on the hills where citrus trees once grew and cattle once grazed. Commercial development intensified with the construction of the Mall of Orange on Tustin Street, The City mall west of the Santa Ana Freeway, and Town and Country shopping center on Main Street.

During the 1970s, land use patterns remained relatively unchanged and no significant growth occurred. The commercial and industrial areas were stable, although the older developments began to show some signs of age and underutilization. The City had not established a redevelopment agency which could serve to inject new life into the aging business districts.

Beginning in the early 1980s, two new major land use trends appeared. First, new lighter, cleaner industrial uses with some wholesaling functions began to replace obsolete industrial operations in the industrial district and along Katella Avenue. Second, and more significantly, Orange began to emerge as a major center for high-rise office development, and the area surrounding The City shopping center and the Main Street/Garden Grove Freeway intersection experienced tremendous growth and redevelopment activity.

National and regional economic factors have contributed to the changes in land use in the City's industrial and commercial districts. The nation has continued to move further away from its position as an industrial society and has begun to produce more high technology goods and provide more services. Consequently, the need for large industrial buildings has diminished substantially. Office space and smaller industrial developments now accommodate the needs of the nation's businesses.

In Orange County during the late 1970s and early 1980s, the south County area, especially around Newport Beach's Fashion Island and the Orange County airport, served as the center for new office and industrial park development. As the demand for such space continued to increase and land costs in southern Orange County spiraled, developers turned their sights toward central Orange County and the tri-city area of Orange, Anaheim and Santa Ana. This area offered cheaper land, a large employment pool in both Orange and Los Angeles Counties, and superior access to major transportation routes. Also, both the Anaheim and Santa Ana redevelopment agencies offered incentives to developers to locate in their cities.

Orange has benefitted from redevelopment activity in these adjacent cities. In 1983, the City formed its own redevelopment agency, and the agency has encouraged and facilitated the recent high-rise office development occurring around The City shopping center. Redevelopment and Planning staff anticipate that the trend toward high-rise and medium height office buildings will continue in and around the City shopping center and north of Chapman Avenue on both sides of the Orange Freeway.

While high intensity development has been concentrated along the freeways, lower intensity office developments have begun to appear throughout the industrial district. New industrial uses consist primarily of light manufacturing and wholesale distribution operations. This trend is particularly apparent along Katella Avenue. As older manufacturing operations close, it is anticipated that the smaller, cleaner businesses will continue to replace them.

4.0 EXISTING LAND USE PLANS

Orange has several land use plans which direct the type, intensity and distribution of land use within the corporate City limits and surrounding sphere of influence area. Section 65359 of the California Planning, Zoning and Development Laws (Title 7 of the California Government Code) establishes a hierarchy of plans which places the general plan at the top of these plans. All other plans, including redevelopment plans, specific plans, design guideline manuals and, particularly the zoning ordinance, must be consistent with the general plan to ensure uniform implementation of established land use policy.

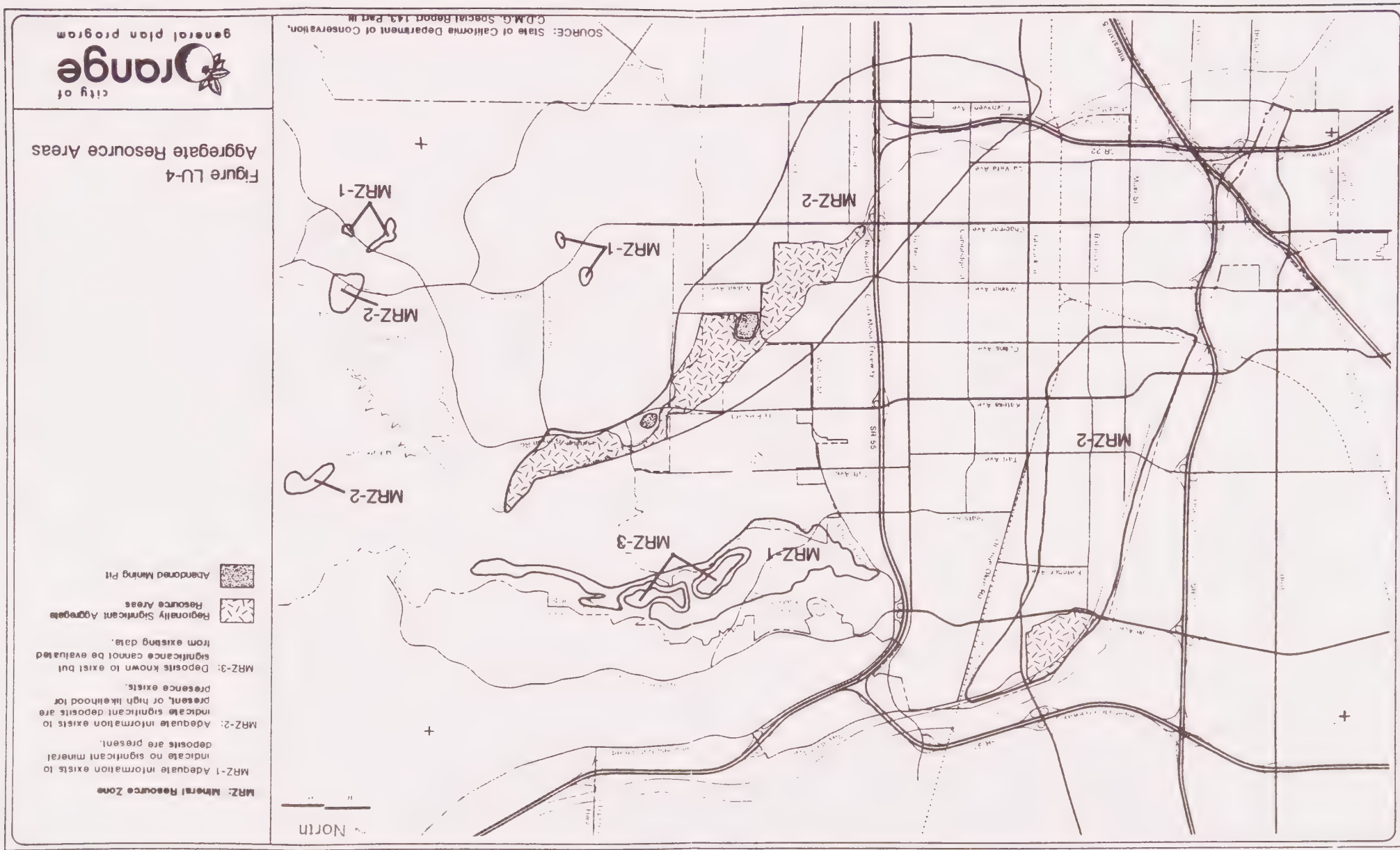
Zoning Ordinance

In a sense, the zoning ordinance is a land use plan because it indicates the distribution and intensity of allowable land use within the City. Although zoning serves to implement general plan land use policy, the lay public often views the zoning ordinance as the City's master land use plan.

Zoning ordinance regulations guide development intensity by setting limits on building height, by requiring building setbacks or by specifying the percentage of site area which may be covered by structures and the amount which must be landscaped. The zoning ordinance also indicates which land uses are permitted in the various zones.

Redevelopment Plans

Orange has two adopted redevelopment plans: the Tustin Street and the Southwest Area plans. Plan boundaries are delineated on Figure LU-5. The Agency proposes to extend the boundaries of both plans. In addition, the Redevelopment Agency proposes establishing a third redevelopment project area to encompass industrial properties located between the Santa Ana River and Glassell Street, and Orangewood Avenue and Fletcher Avenue. If plan amendments and new plan adoption is accomplished as proposed, all major commercial and industrial properties in Orange will lie within redevelopment project areas.



Tustin Street Redevelopment Project Area:

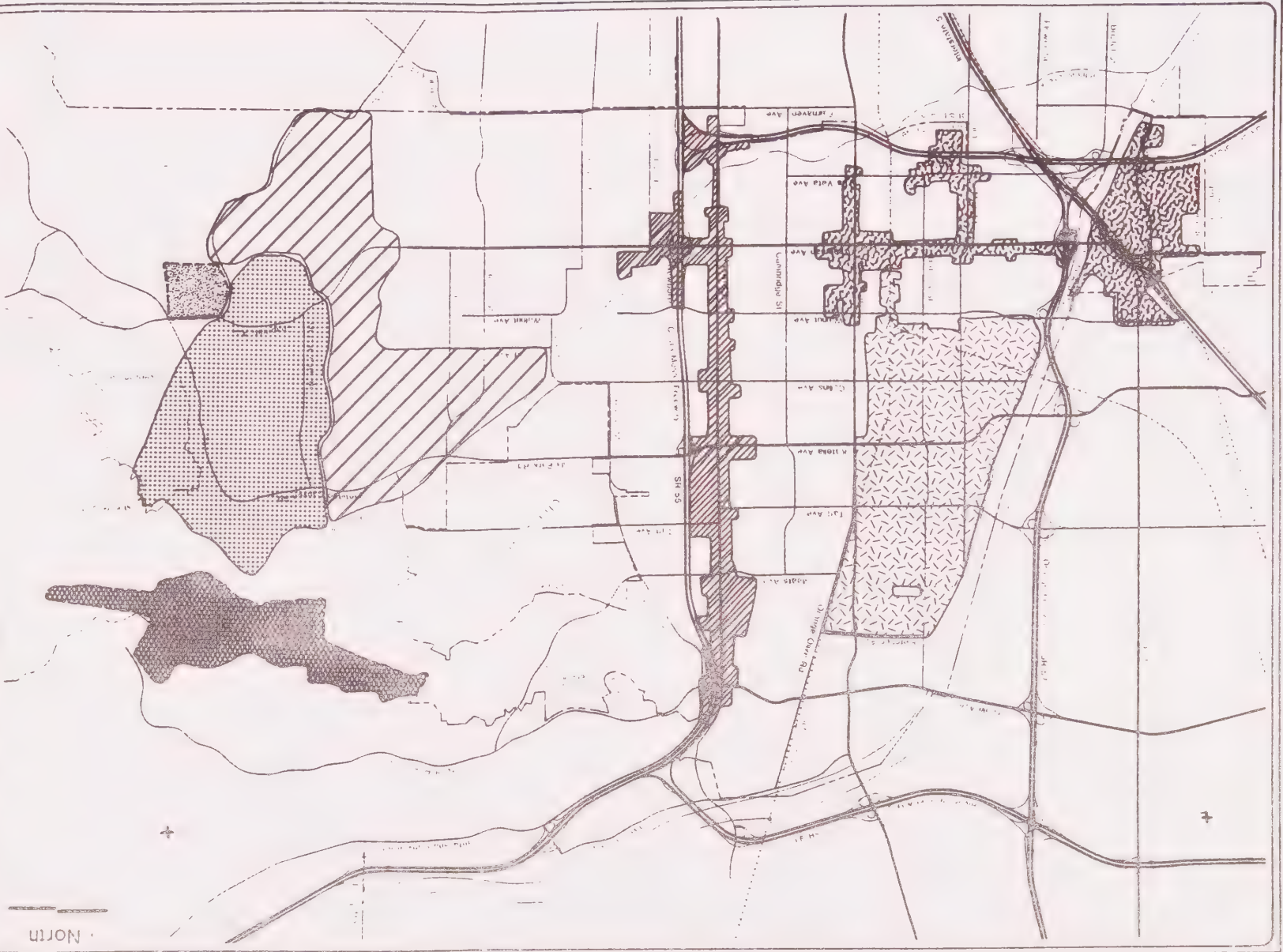
Established in 1983, the Tustin Street redevelopment project area encompasses commercial properties east and west of Tustin Avenue, from Adams Avenue north to Bixby Avenue (Figure LU-5). The plan was developed to meet the following Redevelopment Agency goals:

- ° Encourage revitalization of the Mall of Orange shopping center;
- ° Improve circulation on Tustin Avenue by consolidating parking areas and thereby eliminating numerous driveways;
- ° Improve the appearance of aging commercial developments; and
- ° Encourage redevelopment of underutilized properties with viable commercial uses.

Major improvements to the area have included redevelopment of Tustin Street/Katella Avenue intersection and construction of several small shopping centers.

The Redevelopment Agency proposes extending the project area to encompass all commercial properties along Tustin Avenue down to the southern City limit (Fairhaven Avenue), and east along Chapman Avenue to Yorba Street. These boundaries are shown on Figure LU-5.

Southwest Redevelopment Project Area: The Southwest Area plan, adopted in 1984, originally covered the 309 acres of land occupied by and surrounding The City shopping center. In July of 1986, the Redevelopment Agency amended the plan and expanded the project area significantly to include an additional 458 acres. The plan boundaries now extend down Chapman Avenue to Glassell Street and north and south along Glassell Street, as well as down Main Street to the southern City limit. Portions of the Old Towne District now lie within the project area. Project area boundaries as of September 1987 are shown on Figure LU-5.



North

Figure LU-5
Existing and Proposed
Land Use Studies
(September 1987)

The area west of the river has experienced extensive redevelopment activity, encouraged by a strong market demand for quality office space and support retail/service uses. As discussed in Section 2.0 of this report, a combination of high-rise office buildings and lower intensity business park development has transformed The City area into a major mixed-use business center.

Little redevelopment activity has occurred east of the Santa Ana River with the exception of the Main Street/La Veta Avenue intersection. High-rise office buildings have been constructed along the Garden Grove Freeway, although market forces rather than Redevelopment Agency assistance led to this intensification of land use. Infrastructure improvements are required to accommodate renovation and intensification of uses along Chapman Avenue and Glassell Street.

Northwest Redevelopment Project Area: The proposed Northwest redevelopment project area may be considered the City's industrial redevelopment plan since the tentative boundaries include all properties within the City's industrial district. Proposed boundaries (September 1987) are indicated on Figure LU-5.

The primary factor driving the decision to adopt a redevelopment plan for this area is the transition toward new land uses. Gradually, aging, obsolete, heavy industrial operations are being replaced by light manufacturing and commercial uses, including office buildings. By adopting a redevelopment plan, the City will be able to focus and encourage similar uses in specific areas and benefit from potential increased property values resulting from redevelopment. In particular, existing trends toward moderate and high intensity office uses at Orangewood Avenue and Eckhoff Street may extend north toward Collins Avenue and east to the Bitterbush drainage channel.

Specific and Area Plans

One specific plan and two area plans have been adopted for three areas of Orange, as shown on Figure LU-5. These plans cover areas known as Upper Peters Canyon, Orange Park Acres and East Orange. In addition, a specific plan will be prepared for the 730 acre Serrano Heights property in northeast Orange.

Upper Peters Canyon: In 1984, the City Council adopted the 230-acre Upper Peters Canyon Specific Plan and incorporated the site into the City. The plan, prepared by the Irvine Company, calls for the development of a residential community with support commercial and public facility uses. Similar to other Irvine Company development, the plan provides for landscaped parkways and open space corridors.

Orange Park Acres: Orange Park Acres is one of the County "islands" lying within and surrounded by the City corporate limits (Figure LU-5). Although Orange Park Acres properties are subject to County rather than City land use regulations, development of Orange Park Acres affects adjacent City properties, just as the City's land use policy influences County land use decisions.

The Orange Park Acres Area Plan, adopted in September of 1973, calls for three general categories of land use - residential, institutional and open space. In an effort to retain the area's semi-rural environment, the plan allows residential development to consist only of large lot single family homes or clustered medium density developments. The plan provides for many acres of open space and recreational uses. No significant commercial development is anticipated in this area.

East Orange General Plan: In August of 1975, a joint City of Orange/County of Orange land use plan was adopted for approximately 1,900 acres of land in east Orange. The plan boundaries encompass several sub-areas, or neighborhoods, most of which lie in the City of Orange and some of which are in unincorporated County areas (Figure LU-5).

The land use designations for City areas have been incorporated into the City's General Plan Land Use Policy map. In general, the plan allows for low density (up to two units per acre) residential development in hillside areas and higher density development (3.5 to 15 units per acre) along Chapman Avenue. Many acres of private open space are also provided in the hills. The plan indicates the location of equestrian and bicycle trails as well as public parks.

Serrano Heights: Owners of the Serrano Heights property (Figure LU-4) propose to prepare a specific plan consistent with general plan land use policy.

Residential development is to be clustered along the proposed extension of Serrano Avenue, leaving large tracts of undeveloped hillsides along the northern City boundary. An estimated 1,800 residential units is expected to result from implementation of the specific plan.

Regional Transportation Plans

The Orange County Transportation Corridor Agencies are in the process of developing plans for major transportation improvements which will facilitate better traffic flow through and around Orange County. The Agencies' plans call for the construction of several new high volume transportation corridors, one of which would pass just east of the existing Orange City limits. The location shown is generalized since the Agencies are still in the process of delineating the precise roadway alignment.

This roadway, known as the Eastern Transportation Corridor, will be a designated arterial. The City's land use planning efforts must take into consideration the land use constraints associated with a transportation route of this size. Namely, the noise, odor and pollutant emissions may preclude noise sensitive development along the route.

Recreation Plans

The County of Orange has prepared a master recreation plan to guide long-term planning for park and trail facilities.

County Plans: The County of Orange Environmental Management Agency, Division of Open Space and Recreation has also developed a master parks plan for areas in and around Orange. The Orange County General Plan Recreation Element calls for the development of two new regional parks (Peter's Canyon and Wier Canyon) and the expansion of two existing parks (Irvine and Santiago Oaks). In addition, the element outlines a regional hiking and riding trail system. The County's recreation plans are described in detail in the Open Space and Conservation Element Technical Report.

An additional County recreation plan is the "Santa Ana River-Santiago Creek Corridor Plan For Recreation and Open Space," prepared in 1971 as a grand plan to establish a series of City and County parks with interconnecting trails along the Santa Ana River and Santiago Creek corridors. According to the plan, the Santiago Creek corridor is to

include multi-use water retention and recreational lakes developed from rehabilitated gravel pits.

To this date, very little of the Santiago Creek portion of the corridor plan has been implemented. Since the advent of Proposition 13 in 1979, cities and counties have noticed a marked decrease in the availability of funds for nonrevenue generating services and facilities such as parks and other recreational facilities. The City of Orange Department of Community Services now indicates the time is appropriate to reconsider proposed land uses along Santiago Creek.

**Historic
Preservation
Design
Guidelines**

To implement the Old Towne historic preservation goals and policies outlined in the Historic Preservation element, the City adopted design guidelines in August of 1985. The guidelines contain development standards for building and siting design, as well as building materials, colors, illumination and signage, for structures within the Old Towne historic district. The guidelines do not direct land use policy.

5.0 LAND USE CONSTRAINTS

State general plan law requires that the land use element identify lands subject to flooding. It is appropriate to present flooding and other environmental constraint information in the Land Use Element because this information can and should be used in the land use decision-making process. In Orange, the constraints imposed by natural environment include flooding, landsliding and steep slopes. These issues, discussed in detail in the Public Safety Element Technical Report, are treated only cursorily here. To avoid duplication of mapping efforts, relevant maps and other graphics are contained in the Public Safety Element Technical Report.

Other development or land use constraints addressed in this technical report include existing land use patterns and land availability.

Environmental

Flooding: Flood hazards are most often defined in relation to a flooding event referred to as the "100-year flood." As its name implies, the 100-year flood is considered to be the flood which would result from the heaviest rainfall in a 100-year period. Most major flood control facilities are designed to contain the rainfall and run-off resulting from a 100-year storm event.

Orange contains two major drainage courses which collect virtually all of the surface run-off during rainstorms. These facilities are the Santa Ana River and Santiago Creek.

The Santa Ana River, which forms the western City boundary, serves the major flood control facility for large portions of Orange, Riverside and San Bernardino Counties. River improvements and Prado Dam, located about 20 miles upstream from Orange, were designed to provide protection from the 200-year flood. However, increased urbanization throughout the three counties and siltation behind Prado Dam has made the system incapable of handling storm flows larger than 70-year magnitude. (Huntington Beach Planning Division)

In Orange, properties located east of the Santa Ana River receive adequate protection from the 100-year flood. The river banks are leveed, and several drainage channels and retention basins provide

flood protection, as shown on Figure LU-6. West of the river, however, flood control facilities are inadequate. Figure LU-6 indicates that all properties adjacent to the westside of the river would be inundated during the 100-year flood.

Properties along Santiago Creek are fairly well protected from 100-year storm flows. The 100-year flood area displayed on Figure LU-6 generally conforms to the creek floodway and includes the abandoned gravel pits which now serve as flood control and ground water recharge basins. At Hart Park in south Orange, Santiago Creek courses through the park's parking lot, which can be under water during times of heavy rainfall.

Because practically all of the land area flanking Santiago Creek and the Santa Ana River are urbanized, flood hazard do not place unusual constraints on land use and new development in these areas. The City participates in the National Flood Insurance Program. This program requires the City to adopt strict land use regulations for flood prone areas and to ensure adequate flood protection.

Landsliding and Slope Hazards: Figure S-2 in the Public Safety Element Technical Report identifies the hilly areas of the City where steep slopes and potential landslide hazards may limit the extent and intensity of urban development.

Existing Land Use Patterns and Land Availability

With the exception of the rolling hills in northeast Orange and scattered vacant lots throughout the City, virtually all of the General Plan planning area is developed. Land use patterns are well defined, and most new development is occurring consistent with those patterns. New residential units in the east Orange hills and commercial and industrial complexes in the City's redevelopment project areas comprise the majority of the development activity.

Topographical and access constraints should serve to limit development of the hillsides to mostly lower density residential units. Given the shortage of land available for multiple unit projects, the redeveloping commercial areas of Tustin Street and southwest Orange could experience an increase in demand for high intensity residential development alongside retail and service commercial establishments, land use regulations permitting. Otherwise, no significant changes in land use patterns are anticipated.

6.0 REFERENCES

1. "Mineral Land Classification of the Greater Los Angeles Area," Special Report 143, Part III, California Division of Mines and Geology, 1981.
2. State of California General Plan Guidelines, State Office of Planning and Research, June 1987.
3. "Southwest Orange Study - Land Use Strategy Plan Technical Appendices," City of Orange Redevelopment Agency, July 1987.
4. "City of Orange Housing Element," Preliminary Draft, March 1987.
5. "Flooding - Flood Protection and the National Flood Insurance Program in Huntington Beach," a Special Report prepared by the City of Huntington Beach Planning Division, October 1, 1980.

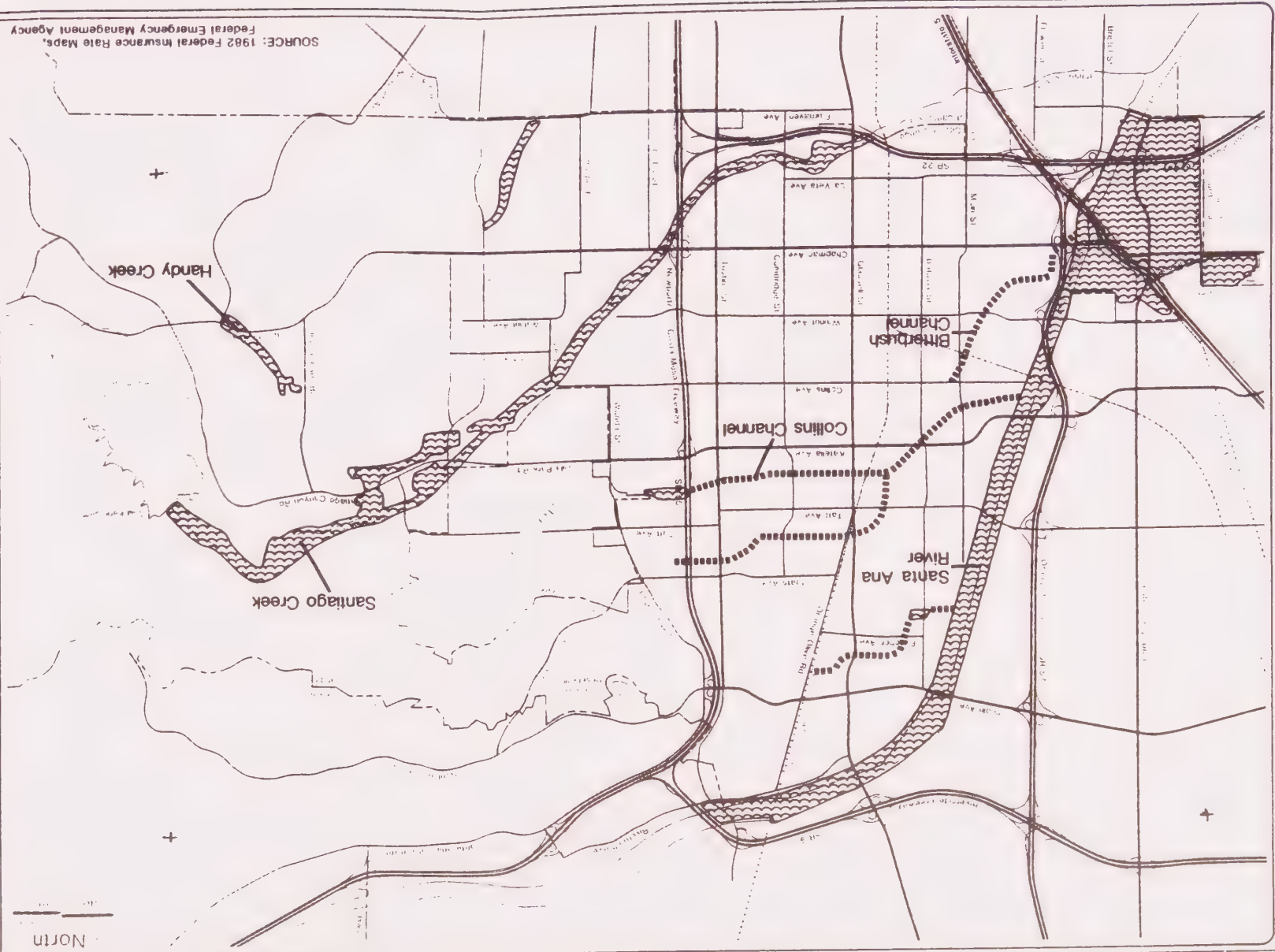


Figure LU-6
Lands Within the
100-Year Flood Zone



Orange
City of America

SOURCE: 1982 Federal Insurance Rate Maps,
Federal Emergency Management Agency

Circulation Element Technical Report



**CITY OF ORANGE
GENERAL PLAN TRAFFIC ANALYSIS**

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November 18, 1988

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I. INTRODUCTION

This report describes the results from the General Plan traffic analysis carried out for the City of Orange. The purpose of the analysis was to provide a technical background for the General Plan update being prepared by the city. The material contained in this report addresses current conditions and then analyzes capacity needs for future buildout conditions. The type of improvements needed to provide adequate capacity are then discussed.

OBJECTIVES AND SCOPE

A primary goal of the circulation system is to provide adequate capacity for the adopted land use element of the General Plan. The analysis carried out here recognizes the interdependency between land use and circulation, and analyzes the circulation system needs within that context.

Consistent with General Plan analyses, the General Plan time frame is labeled here as Post-2010, which represents buildout of the General Plan. Present day conditions on the circulation system are described in the first section of this report, and then projections made for the Post-2010 buildout time frame.

One of the key components of the traffic analysis was the development of a traffic forecasting model for the City of Orange. The Orange Traffic Model (OTM) enables land use and circulation alternatives to be examined and capacity deficiencies determined accordingly. Development of this model formed one of the major tasks of this work effort and has resulted in a tool that can be used for on-going traffic analysis work in the city.

Recognizing the regional context of the City of Orange, the OTM was developed within a larger regional context using data prepared by the County of Orange. Hence, external and through traffic on those portions of the Orange circulation system that can be considered regional in nature are determined from these regional projections. At the same time, the traffic forecasts in the City itself are forecast by the more detailed, fine-grained modeling capability embodied in the City's traffic model.

A description of the OTM can be found in a companion document (Reference 1 at the end of this chapter). The area used for forecasting purposes is somewhat greater than the city

incorporated area, and is illustrated in Figure I-1. It is generally referred to as the "analysis area."

REFERENCES

"City of Orange Circulation Study - Traffic Model Description," Austin-Foust Associates, August, 1988



LEGEND

- Analysis Area Boundary
- Orange City Limit Boundary

Figure I-1

OTM TRAFFIC ANALYSIS AREA



AUSTIN-FOUST ASSOCIATES, INC.

II. EXISTING CONDITIONS

This chapter describes the existing circulation system in the City of Orange traffic analysis area. Recent traffic volume counts are summarized and existing levels of service (LOS) are shown by comparing these volumes to the capacity of the existing circulation system.

EXISTING ROADWAYS

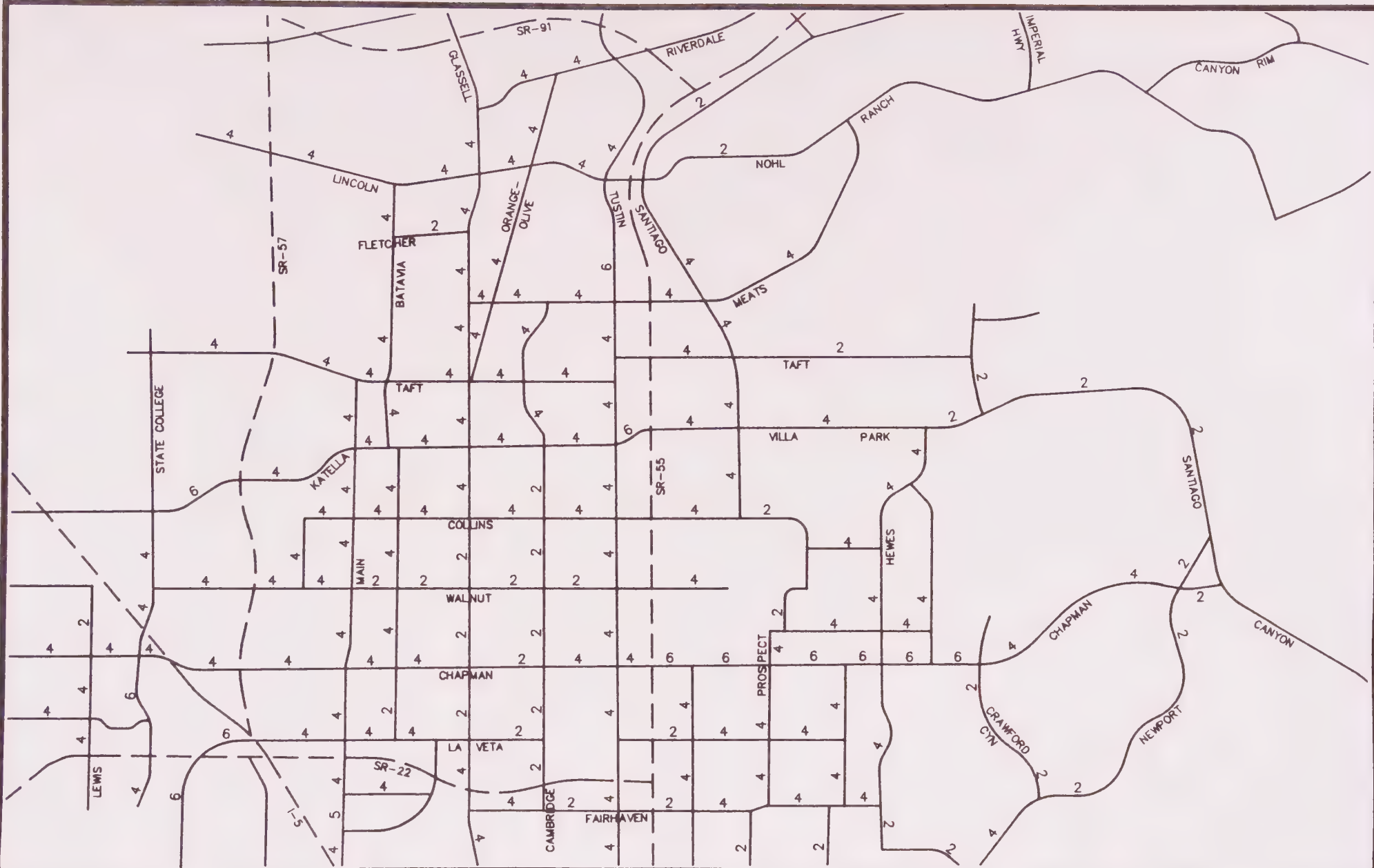
The existing roadway system in the traffic analysis area is illustrated in Figure II-1. Shown here are the current number of lanes (midblock) on individual roadway segments. Included are those roadways designated as secondary arterial or above on the current arterial highway plan.

Figure II-2 shows recent ADT volumes as assembled from traffic count data collected by the City of Orange together with volume/capacity ratios based on the current number of lanes. The roadway level of service in relation to the ADT counts is measured using equivalent ADT capacity values are defined here. While roadway capacity is largely a function of peak hour volumes at intersections, ADT link capacities can give a general measure of the overall level of service on the circulation system. Accordingly, the following ADT capacity values are used in this analysis:

Two-lane Commuter Roadway	12,000
Four-lane Secondary Arterial	24,000
Four-lane Primary Arterial	37,500
Six-lane Major Arterial	56,300

These represent absolute capacity (level of service "E"). A volume/capacity ratio from .8 to .9 represents LOS "D" and from .9 to 1.0 represents LOS "E."

As can be seen from the existing volume/capacity ratios, certain facilities are at LOS "E" or worse based on these ADT capacities. Tustin Avenue along most of its length and Chapman Avenue east of Glassell near SR-55 are the most significant in that regard. Santiago north of Villa Park, Collins east of Santiago, Walnut west of Tustin and Fairhaven east of Tustin are also operating at LOS "E."



LEGEND

X Number of Midblock Lanes

Figure II-1

1987 EXISTING CIRCULATION SYSTEM

PLANNED CIRCULATION SYSTEM

The planned arterial circulation system, as designated in the county Master Plan of Arterial Highways (MPAH) and the city's current General Plan circulation system, is shown in Figure II-3. As will be shown later in this report, the MPAH implies widening of certain existing facilities and also the addition of new links.

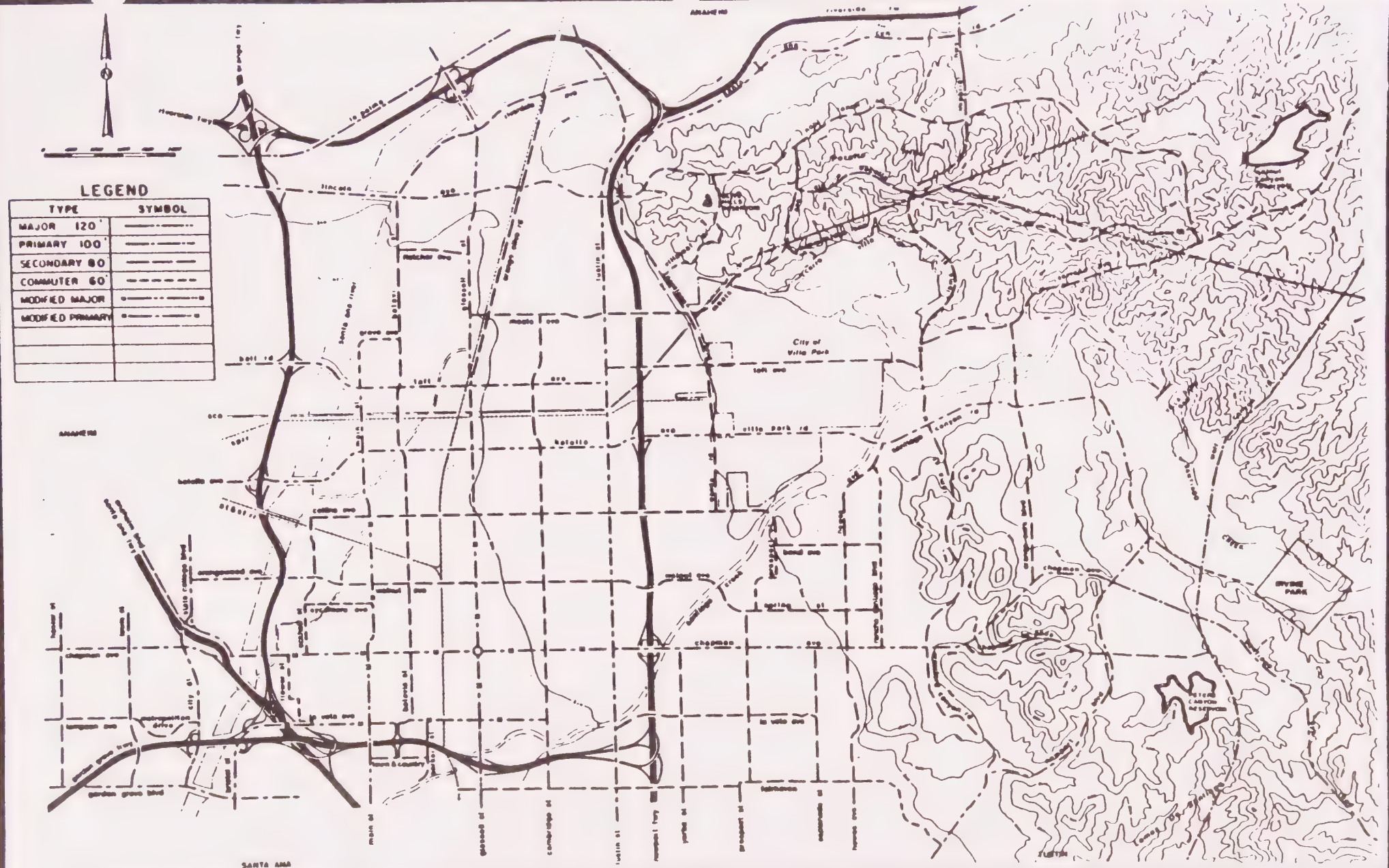


Figure II-3

MASTER PLAN OF ARTERIAL HIGHWAYS
FOR CITY OF ORANGE

III. ANALYSIS AREA TRAFFIC FORECASTS

This chapter discusses future traffic demand in the analysis area. The intent is to provide an understanding of the traffic generating characteristics of various land uses and show estimates of future traffic volumes on the analysis area circulation system.

TRIP GENERATION

The traffic generated by a certain type of land use is estimated by applying a representative trip generation rate to the amount of that land use in the area under consideration. The City of Orange Traffic Model (OTM) uses a set of such trip generation rates to calculate both peak hour and ADT trips by land use. These rates are listed in Table III-1, and their derivation is discussed in Appendix A.

Existing land use for the analysis area was prepared as part of the General Plan Study for the city. A detailed land use inventory was made for 1987 conditions, and for traffic forecasting purposes, was aggregated into the OTM traffic zones. Application of the trip generation rates to the land use in each zone results in zonal estimates of daily and peak hour trips.

Table III-2 summarizes the 1987 land use and trip generation for the analysis area, with subtotals for the City of Orange portion. Detailed zonal and sub-area listings can be found in Appendix A. The peak hour trip generation listed here is used in the traffic model to produce peak assignments which are aggregated to create ADT forecasts. Total ADT trip generation for the city is 996,569 vehicle trips, of which 75,571 occur in the AM peak hour and 109,140 in the PM peak hour.

Table III-3 summarizes the corresponding land use and trip generation for buildout conditions (labeled "Post-2010" throughout this report). Total trip generation for the city in this case is 1,520,172, an increase of 60 percent over the 1987 trip generation.

COMMITTED CIRCULATION SYSTEM

The first circulation network alternative tested in this analysis was the currently committed roadway improvements. Figure III-1 shows the improvements featured in this network. The augmented designations noted here represent a facility that has additional lanes

Table III-1

TRIP RATE SUMMARY

LU TYPE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
		IN	OUT	TOTAL	IN	OUT	TOTAL	
1. Res - Low	DU	0.20	0.60	0.80	0.60	0.40	1.00	10.00
2. Res - Medium	DU	0.54	0.18	0.72	0.54	0.43	0.97	8.60
3. Res - Med-High	DU	0.45	0.15	0.60	0.45	0.36	0.81	7.10
4. Res - High/Apt.	DU	0.10	0.40	0.50	0.40	0.20	0.60	6.30
5. Mobile Home	DU	0.05	0.22	0.27	0.23	0.13	0.36	3.39
6. Single-Family Res.	DU	0.20	0.60	0.80	0.60	0.40	1.00	10.00
7. Multi-Family Res.	DU	0.20	0.50	0.70	0.40	0.30	0.70	8.00
8. Hillside Res. (EO)	DU	0.20	0.80	1.00	0.80	0.40	1.20	12.00
9. General Commercial	TSF	0.90	0.80	1.70	2.90	3.10	6.00	70.00
10. Regional Commerical	TSF	0.40	0.20	0.60	1.40	1.50	2.90	35.00
11. Office	TSF	1.90	0.30	2.20	0.60	1.70	2.30	13.00
12. Medical Office	TSF	0.91	0.72	1.63	0.98	2.65	3.63	34.17
13. Industrial	TSF	0.84	0.12	0.96	0.12	0.91	1.03	6.97
14. Industrial Park	TSF	0.76	0.17	0.93	0.20	0.77	0.97	6.97
15. R&D	TSF	0.90	0.10	1.00	0.30	1.10	1.40	10.30
16. Hotel	ROOM	0.50	0.30	0.80	0.40	0.40	0.80	12.00
17. Retail Emp. (1987)	EMP	0.60	0.14	0.74	0.51	0.74	1.25	13.15
Retail Emp. (Post-2010)	EMP	0.60	0.14	0.74	0.51	0.74	1.25	14.45
18. Total Emp. (1987)	EMP	0.23	0.03	0.26	0.07	0.18	0.25	2.40
Total Emp. (Post-2010)	EMP	0.23	0.03	0.26	0.07	0.18	0.25	2.60
19. Hospital	BED	0.77	0.30	1.07	0.46	0.76	1.22	11.75
20. Church	TSF	0.08	0.03	0.11	0.34	0.30	0.64	7.70
21. Library	TSF	1.55	1.56	3.11	3.28	2.92	6.20	45.50
22. Fire Station	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	20.00
23. Cemetary	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	4.16
24. Elementary School	STU	0.17	0.09	0.26	0.10	0.14	0.24	1.03
25. Junior High School	STU	0.17	0.09	0.26	0.10	0.14	0.24	1.03
26. High School	STU	0.22	0.07	0.29	0.13	0.11	0.24	1.39
27. Com. Recreation	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	40.00
28. Park	ACRE	0.20	0.00	0.20	0.20	0.20	0.40	5.00
29. County Facil. (SG)	UNIT	0.56	0.16	0.72	0.10	0.84	0.94	10.00
30. Golf Course	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	6.00
31. Maintenance Yard	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	20.00
32. Collge	STU	0.15	0.03	0.18	0.04	0.08	0.12	1.55
33. Government Office	TSF	4.94	0.94	5.88	8.16	2.87	11.03	68.93
34. Specialty Commercial	TSF	0.40	0.20	0.60	1.40	1.50	2.90	35.00

Table III-2

1987 LAND USE AND TRIP GENERATION SUMMARY

USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT	
		IN	OUT	TOTAL	IN	OUT	TOTAL		
CITY OF ORANGE*									
1. Res - Low	25418.00 DU	5084	15251	20334	15251	10167	25418	254180	
2. Res - Medium	2499.00 DU	1349	450	1799	1349	1075	2424	21491	
3. Res - Med-High	5165.00 DU	2324	775	3099	2324	1859	4184	36672	
4. Res - High/Apt.	2684.00 DU	268	1074	1342	1074	537	1610	16909	
5. Mobile Home	710.00 DU	36	156	192	163	92	256	2407	
9. General Commercial	4848.48 TSF	4364	3879	8242	14061	15030	29091	339394	
10. Regional Commerical	620.00 TSF	248	124	372	868	930	1798	21700	
11. Office	7858.36 TSF	14931	2358	17288	4715	13359	18074	102159	
12. Medical Office	551.24 TSF	502	397	899	540	1461	2001	18836	
13. Industrial	16361.38 TSF	13735	1962	15697	1962	14880	16842	113969	
16. Hotel	904.00 ROOM	452	271	723	362	362	723	10848	
19. Hospital	1699.00 BED	1308	510	1818	782	1291	2073	19963	
20. Church	1001.90 TSF	80	30	110	341	301	641	7715	
22. Fire Station	2.00 ACRE	0	0	0	0	0	0	40	
23. Cemetary	20.00 ACRE	0	0	0	0	0	0	83	
24. Elementary School	6991.00 STU	1188	629	1818	699	979	1678	7201	
25. Junior High School	1347.00 STU	229	121	350	135	189	323	1387	
26. High School	2978.00 STU	655	208	864	387	328	715	4139	
27. Com. Recreation	69.33 ACRE	0	0	0	0	0	0	2773	
28. Park	125.90 ACRE	25	0	25	25	25	50	630	
29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500	
34. Specialty Commercial	216.39 TSF	87	43	130	303	325	628	7574	
SUBTOTAL		47229	28342	75571	45405	63734	109140	996569	
Remainder of Analysis Area		28513	27322	55835	32251	34152	66403	675940	
TOTAL		75743	55664	131407	77656	97887	175542	1672510	

*Note: The current city boundary does not correspond directly to analysis area zone boundaries. See Figure A-1 of Appendix A for zones included in this summary.

Table III-3

POST-2010 LAND USE AND TRIP GENERATION SUMMARY

USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT	
		IN	OUT	TOTAL	IN	OUT	TOTAL		
CITY OF ORANGE*									
1. Res - Low	26743.00 DU	5349	16046	21394	16046	10697	26743	267430	
2. Res - Medium	9579.00 DU	5173	1724	6897	5173	4119	9292	82379	
3. Res - Med-High	10100.00 DU	4545	1515	6060	4545	3636	8181	71710	
8. Hillside Res. (EO)	317.00 DU	63	254	317	254	127	380	3804	
9. General Commercial	7385.79 TSF	6647	5909	12556	21419	22896	44315	517005	
10. Regional Commerical	628.30 TSF	251	126	377	880	942	1822	21991	
11. Office	25290.68 TSF	48052	7587	55639	15174	42994	58169	328779	
12. Medical Office	63.24 TSF	58	46	103	62	168	230	2161	
13. Industrial	16227.46 TSF	13631	1947	15578	1947	14767	16714	113105	
16. Hotel	460.00 ROOM	230	138	368	184	184	368	5520	
19. Hospital	1395.00 BED	1074	419	1493	642	1060	1702	16391	
21. Library	137.22 TSF	213	214	427	450	401	851	6244	
22. Fire Station	18.00 ACRE	0	0	0	0	0	0	360	
23. Cemetary	47.00 ACRE	0	0	0	0	0	0	196	
24. Elementary School	13060.00 STU	2220	1175	3396	1306	1828	3134	13452	
25. Junior High School	7702.00 STU	1309	693	2003	770	1078	1848	7933	
26. High School	7865.00 STU	1730	551	2281	1022	865	1888	10932	
28. Park	396.10 ACRE	79	0	79	79	79	158	1981	
29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500	
32. College	10080.00 STU	1512	302	1814	403	806	1210	15624	
33. Government Office	93.00 TSF	459	87	547	759	267	1026	6410	
34. Specialty Commercial	579.00 TSF	232	116	347	811	869	1679	20265	
SUBTOTAL		93192	38952	132144	71991	108330	180320	1520172	
Remainder of Analysis Area		86071	77942	164014	98865	107791	206655	2096430	
TOTAL		179263	116895	296158	170856	216121	386976	3616602	

*Note: The current city boundary does not correspond directly to analysis area zone boundaries. See Figure A-1 of Appendix A for zones included in this summary.

LEGEND

- New Connection
- Widening
- (1) 6 Lane Major
- (2) 4 Lane Primary
- (3) 4 Lane Secondary
- (4) 6 Lane Augmented Primary
- (5) 4 Lane Augmented Secondary
- * MPAH Enhancement

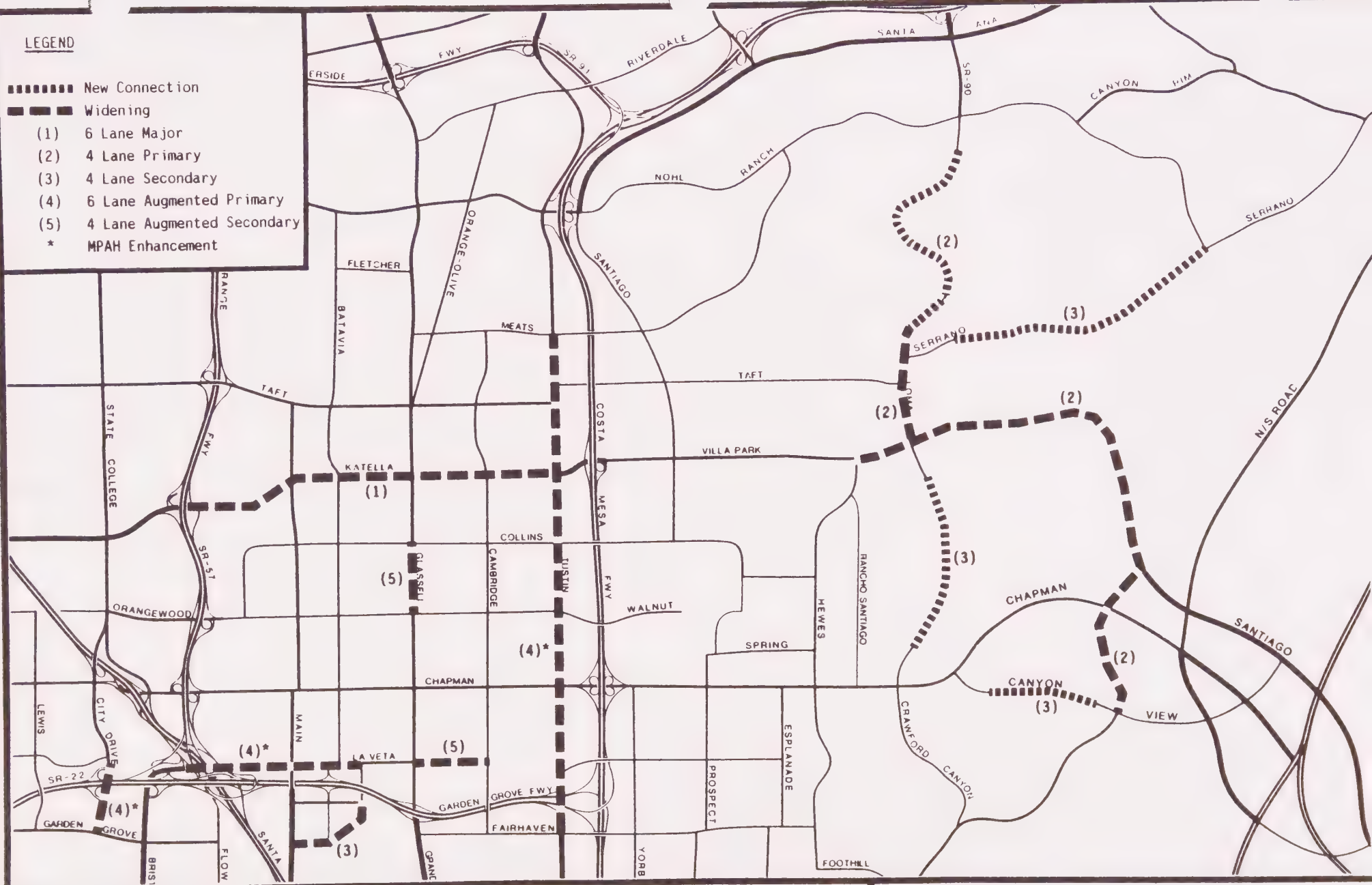


Figure III-1

POST-2010 COMMITTED IMPROVEMENTS

and/or capacity within the standard arterial right-of-way. An augmented major, referred to later in this report, has eight lanes and the same ADT capacity per lane as a six lane major arterial. The augmented primary is a six lane arterial with the same ADT capacity per lane as a four lane primary. The augmented secondary is a four lane limited access roadway with primary level intersections and on-street parking removed, and is therefore assumed to operate with the same ADT capacity per lane as a primary, even though it is built within standard secondary arterial right-of-way. The ADT capacity values for these three classifications are summarized as follows:

Eight-lane Augmented Major	75,000
Six-lane Augmented Primary	56,300
Four-lane Augmented Secondary	37,500

The Post-2010 ADT volumes and corresponding volume/capacity ratios for the committed circulation system are illustrated in Figure III-2. Sections of arterial operating over LOS "D" are shown in Figure III-3. The following are the most significant sections of arterial that are over capacity:

<u>V/C RANGE</u>	<u>LOCATION</u>
.86-1.18	Lincoln/Nohl Ranch from SR-57 to Meats
1.12-1.73	Taft from State College to Glassell
.96-1.33	Katella from State College to Glassell
1.05-1.53	Walnut from SR-57 to Glassell
1.11-2.61	Chapman from Lewis to Main and at SR-55
1.49	La Veta from Tustin to Yorba
1.43-1.62	Fairhaven from Cambridge to Yorba
1.01-1.25	Lewis from Orangewood to Garden Grove
1.12-1.68	State College from Orangewood to Metropolitan
1.14-1.41	Main from Chapman to Town and Country
1.05-1.12	Glassell from Taft to Collins
1.24-1.57	Cambridge from Chapman to Fairhaven

It can be concluded from these results that the currently committed circulation system is generally inadequate to carry the estimated future traffic.





LEGEND

- V/C > 1.00 (LOS F)
- V/C 0.91-1.00 (LOS E)

Figure III-3

POST-2010 LOS SUMMARY
- COMMITTED IMPROVEMENTS

AUGMENTED MPAH CIRCULATION SYSTEM

The committed circulation system has various parts of the network which are not assumed to be improved to current Master Plan standards. In addition, there are potential improvement projects that could augment the current Master Plan. The addition of these improvements to those in the committed circulation system produces what is labeled here as the augmented MPAH system. The major improvements involved are illustrated in Figure III-4 and are discussed below.

A freeway access improvement plan for I-5 north of the SR-22/SR-57 interchange has been developed by the Cities of Orange and Anaheim together with Caltrans. The conceptual design calls for full interchange access with I-5 on Chapman Avenue, The City Drive, Orangewood Avenue and Katella Avenue. The plan will include widening of I-5 to 12 thru lanes consistent with FHWA standards, and in addition, a one-way frontage road paralleling I-5 from Chapman Avenue to Katella Avenue. This plan will also include new freeway crossings at Orangewood Avenue, Pacific Avenue and the Metropolitan Drive extension. Caltrans has estimated that the EIR process for the freeway access improvement plan will be completed by the end of 1989.

The Metropolitan Drive extension mentioned above is a critical link in both the Southwest Orange Redevelopment Plan and the I-5 Freeway Access Improvement Plan. The link extends from The City Drive, across I-5 to Chapman Avenue, and then north to Orangewood Avenue along the Rampart Street alignment. In addition, a Walnut Street connection is added between Metropolitan Drive and The City Drive/State College Boulevard north of Chapman Avenue. These two elements will provide relief to the Chapman Avenue/City Drive area.

Improved arterial sections have also been added at crucial freeway interchange locations. The facilities include Katella, Orangewood, Chapman at SR-57 and Katella and Chapman at SR-55. The assumption here is that the interchanges will be designed such that the volume of traffic served on the arterial through each interchange is greater than a standard major arterial section. This can generally be accomplished by allowing unsignalized access to ramps by certain movements through each interchange. For capacity evaluation purposes, each arterial section has been classified as an eight lane augmented major to reflect the assumed increased service capacity.

LEGEND

- New Connection
- Widening
- (1) 4 Lane Primary
- (2) 4 Lane Secondary
- (3) 8 Lane Augmented Major
- (4) 6 Lane Augmented Primary
- (5) 4 Lane Augmented Secondary
- * MPAH Enhancement

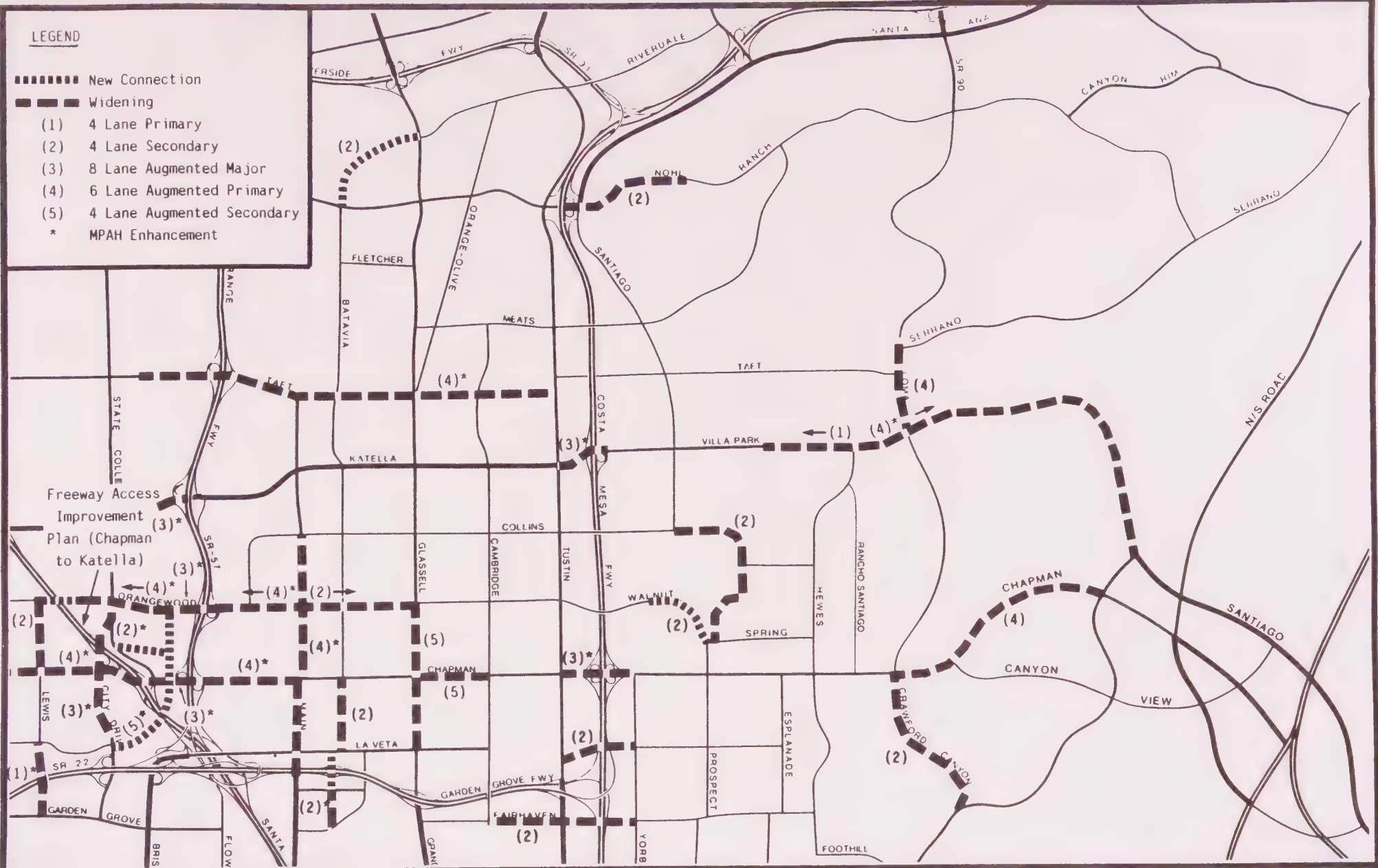


Figure III-4

POST-2010 AUGMENTED
MPAH IMPROVEMENTS

As mentioned at the beginning of this section, there are roadways in the MPAH system that are not assumed to be improved to their current Master Plan designations. This is the case on Cambridge Street from Fairhaven Avenue to Katella Avenue and on Walnut Avenue from Glassell Street to Tustin Street. Both facilities have been downgraded from secondary to commuter classification for this analysis. These downgrades are a result of citizens' requests and petitions to preserve neighborhood integrity of the residential areas in that part of the city.

Post-2010 ADT volumes and volume/capacity ratios for the augmented MPAH system are illustrated in Figure III-5. Sections of arterial operating above LOS "D" are summarized in Figure III-6.

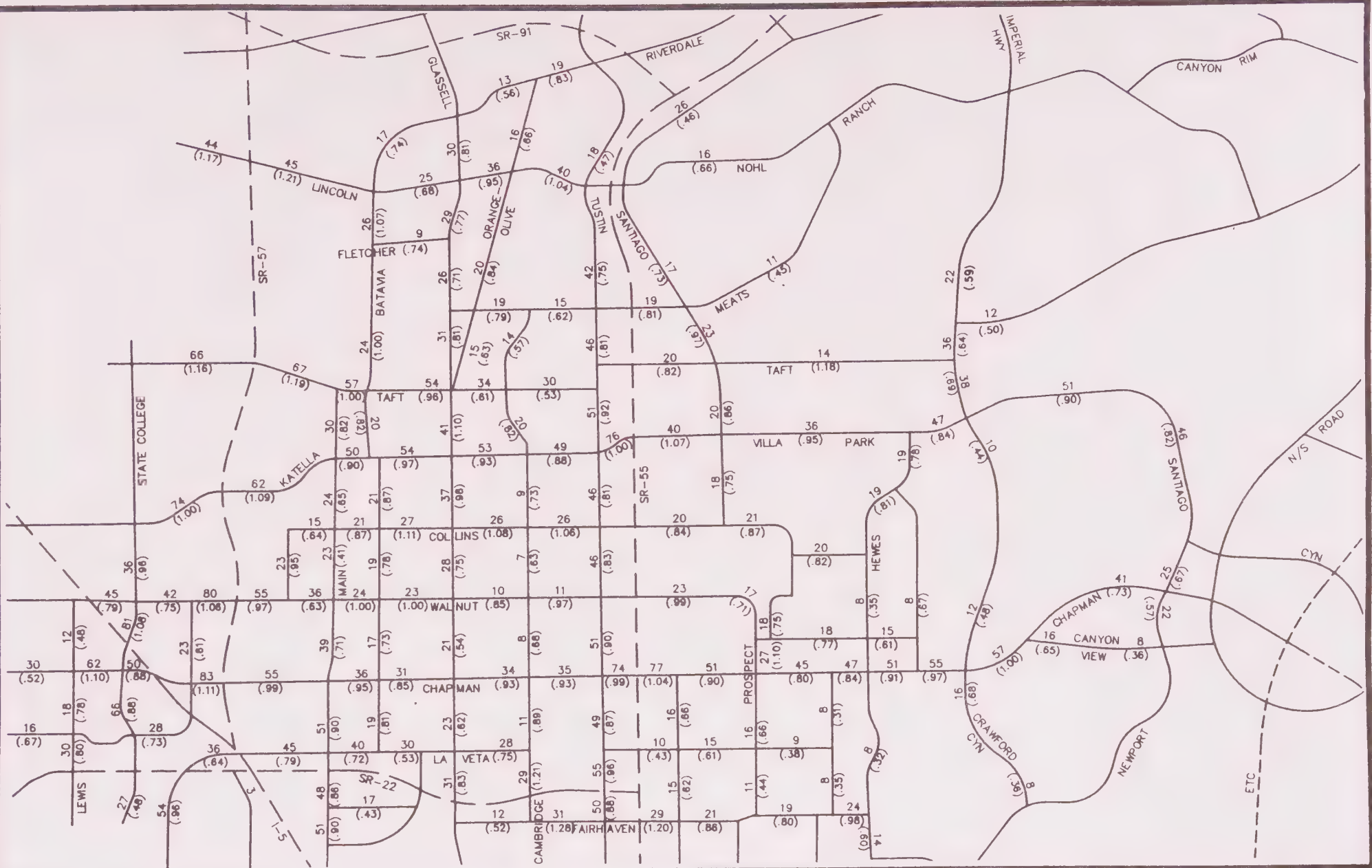
Although the deficiencies are substantially reduced compared to the committed system, the following significant problem areas remain:

<u>V/C RANGE</u>	<u>LOCATION</u>
.95-1.21	Lincoln from SR-57 to Batavia and from Glassell to Tustin
.96-1.19	Taft from State College to Glassell
1.07-1.09	Katella east of SR-57 and east of SR-55
1.06-1.11	Collins from Batavia to Tustin
1.04-1.11	Chapman from Lewis to SR-57 and east of SR-55
1.20-1.28	Fairhaven from Cambridge to Yorba
1.08	State College from Walnut to Chapman
1.07	Batavia south of Lincoln
1.10	Glassell from Taft to Katella
1.21	Cambridge from La Veta to Fairhaven

SPECIAL ADDITIONAL LINKS

There are several new or improved roadway segments that are either currently on the Master Plan, or could be added to the Master Plan to provide additional capacity. One of the purposes of the traffic analysis is to provide recommendations as to the inclusion of these links in the city's circulation system. Special analyses were therefore carried out to show "with" and "without" conditions in each case.

The links which are specially analyzed here are as follows:



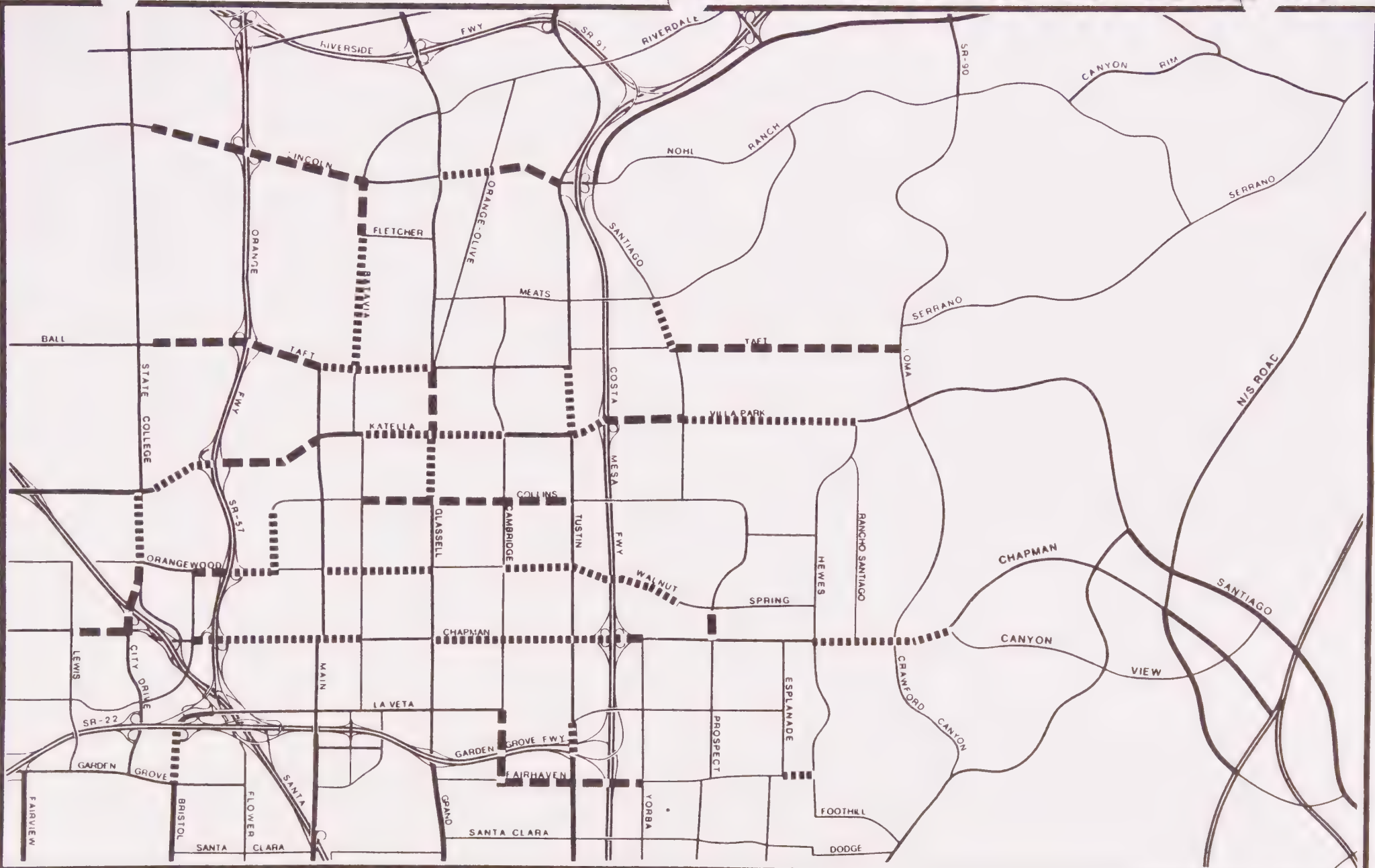
Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure III-5

POST-2010 AUGMENTED MPAH
NETWORK ADT VOLUMES



LEGEND

- — — — — $V/C > 1.00$ (LOS F)
- $V/C 0.91-1.00$ (LOS E)

Figure III-6

POST-2010 AUGMENTED MPAH
ADT LOS SUMMARY

1. Extension of Eckoff Street north to Katella Avenue
2. Connection of La Veta Avenue east to Tustin Street
3. Walnut Avenue crossing of Santiago Creek
4. Expansion of Villa Park Road from four to six lanes from SR-55 to Hewes Street

The results of analyzing each of these individually are described below.

Eckoff Extension

This link would extend directly north from the current alignment of Eckoff across a flood control channel to a connection with Katella just east of the Santa Ana River. It would provide north-south capacity parallel to the river and hence parallel to SR-57.

The results of the traffic forecasts with and without this connection are shown in Figure III-7. Since its impacts are generally localized, only the immediately surrounding area has been shown in this diagram. As can be seen here, the link would attract around 18,000 vehicles per day, most of this being diverted from Main Street.

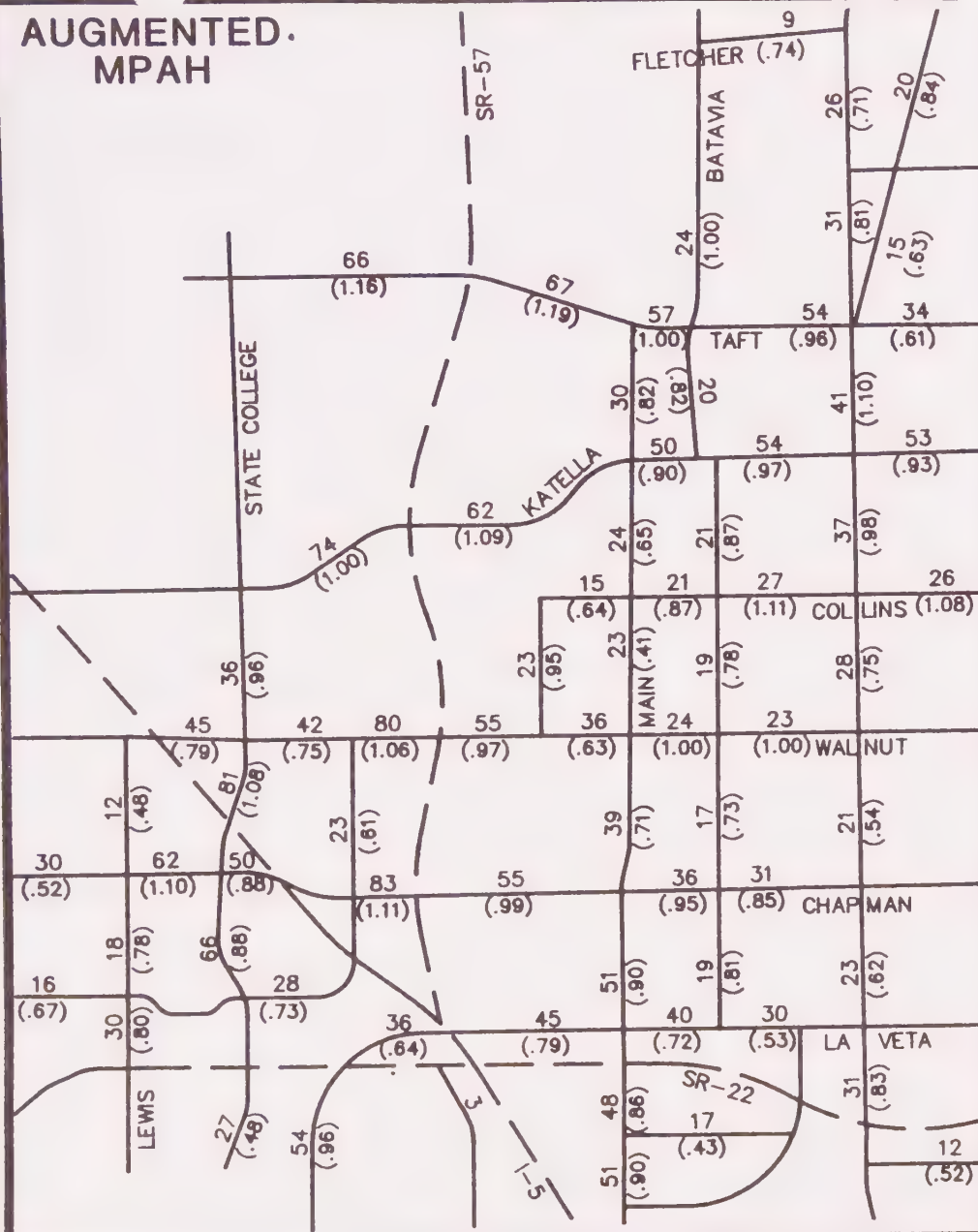
Because that section of Main Street between Orangetown and Katella was shown to have adequate capacity under the augmented MPAH circulation system, there is no major justification for this link under the traffic volumes forecast here. This extension could be shown on the MPAH as a special study area, and should be reexamined as adjacent development and redevelopment occurs.

La Veta Extension

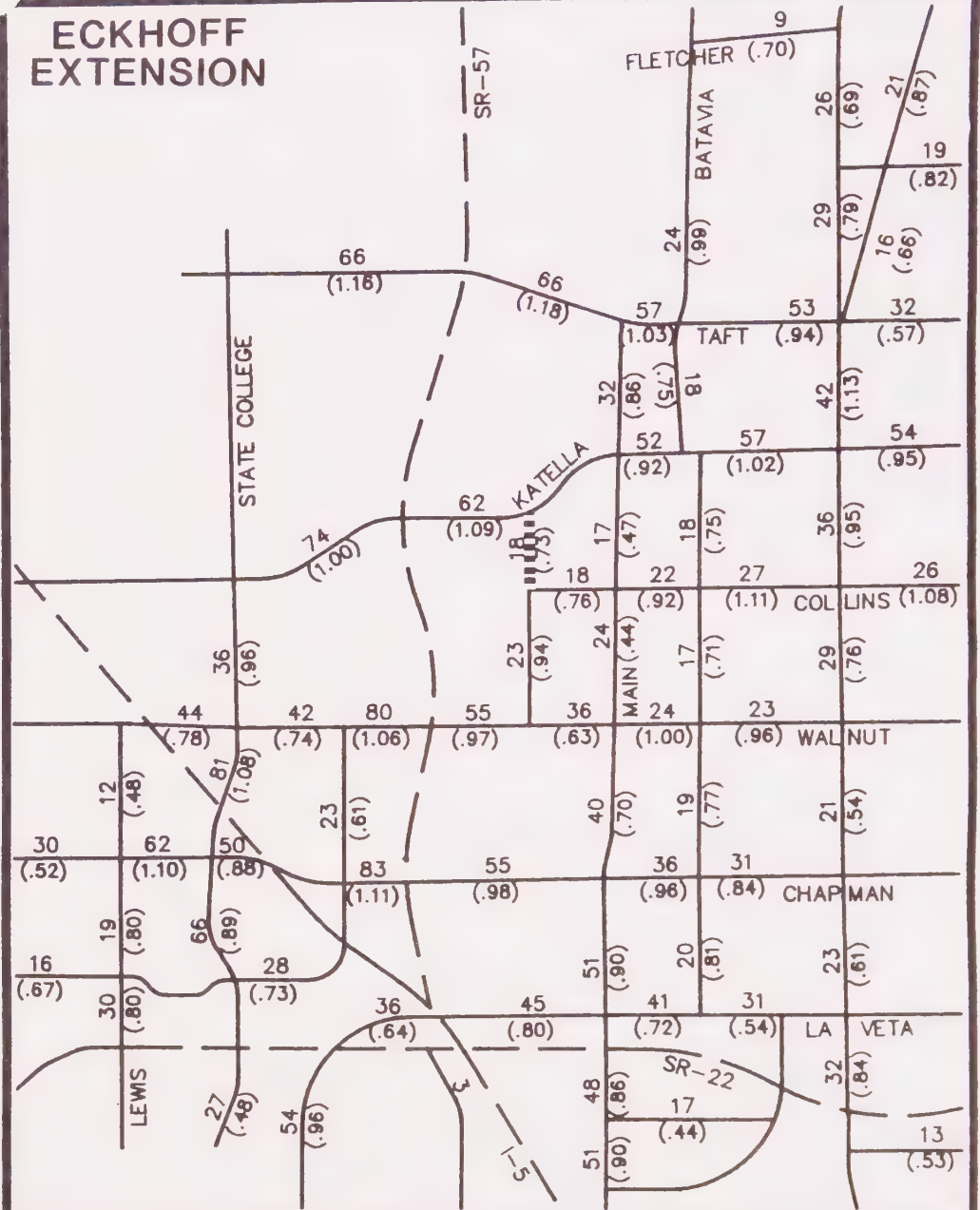
This link would connect La Veta eastward from Cambridge Street to Tustin Street. The connection would form a grid street system that provides east-west continuity through the city along this arterial. In particular it would provide an alternative access to Tustin Street, diverting traffic from the parallel sections of Chapman and Fairhaven.

Traffic volumes with and without this link can be seen in Figure III-8. The connection carries 22,000 vehicles and reduces volume on Fairhaven east of Cambridge from 31,000 to 18,000. Cambridge Street south of La Veta is also relieved with the added Tustin Street access provided by the La Veta connection.

AUGMENTED. MPAH



ECKHOFF EXTENSION



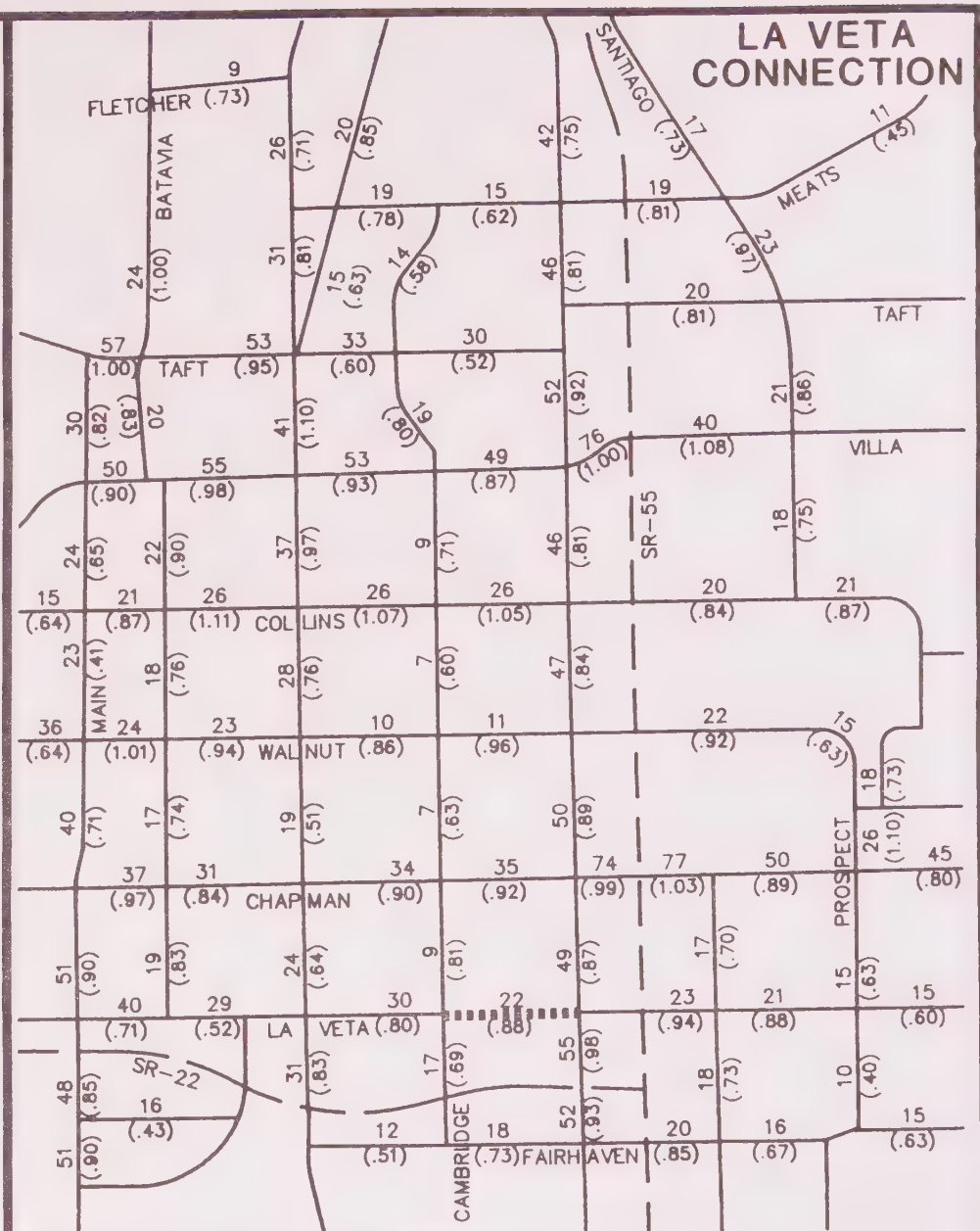
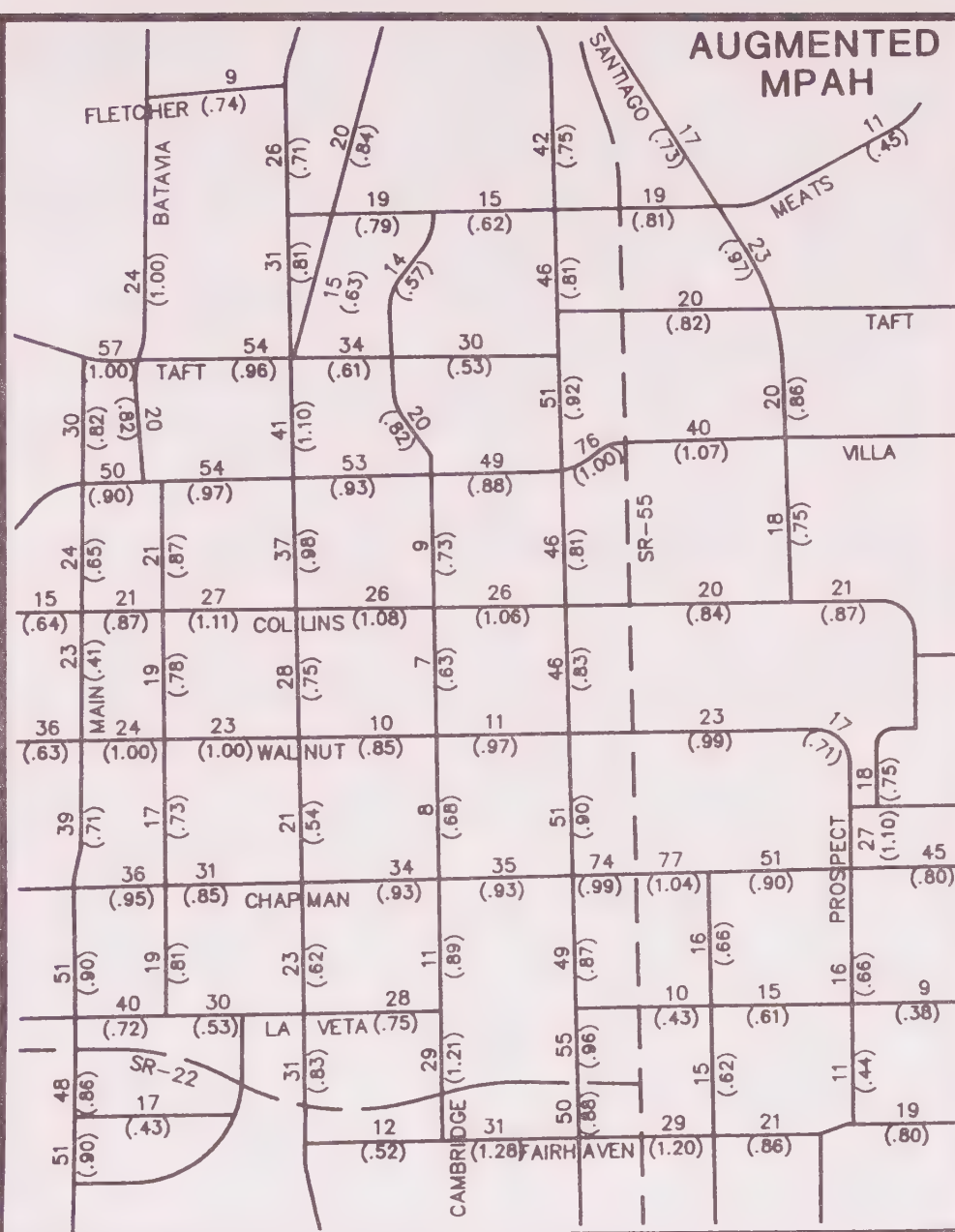
Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure III-7

POST-2010 ADT COMPARISON
- ECKHOFF EXTENSION



Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure III-8

POST-2010 ADT COMPARISON
- LA VETA CONNECTION

Because of the critical need for east-west capacity in this part of the city, it is recommended that the link be added to the city's Master Plan.

Walnut Avenue across Santiago Creek

This link is currently on the city's Master Plan, and would require constructing a bridge across Santiago Creek. Circulation continuity would then be provided between the current section of Walnut which crosses the SR-55 Freeway and Prospect, and hence to Chapman.

By making this connection, an alternative east-west route to the currently overloaded Chapman Avenue would be provided. Figure III-9 shows the volumes with and without this connection. As can be seen, traffic is diverted both from Collins to the north and Chapman to the south.

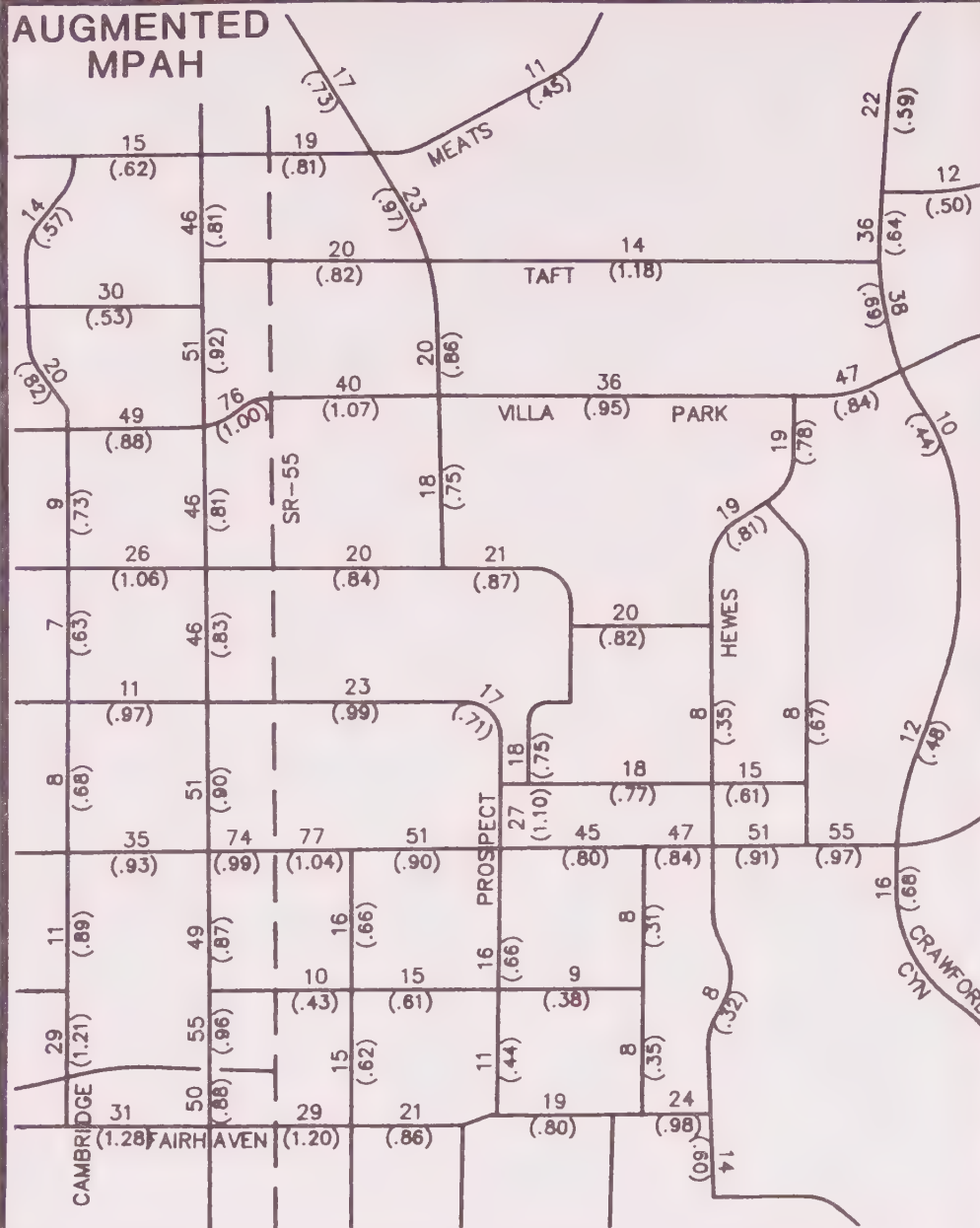
A further addition to this alternative would be the extension of Wanda Road south of Collins. Such a connection would provide north-south capacity parallel to the SR-55 Freeway. Figure III-10 shows that this additional connection reduces volumes on Tustin south of Collins and Prospect north of Spring. However, those facilities are shown to operate below capacity without the extension, and the extension does not noticeably improve other significant problem areas such as Chapman near the SR-55, or Prospect north of Chapman.

Based on these volumes it is recommended that the Walnut extension be retained on the Master Plan, but that Wanda only be considered as a local street.

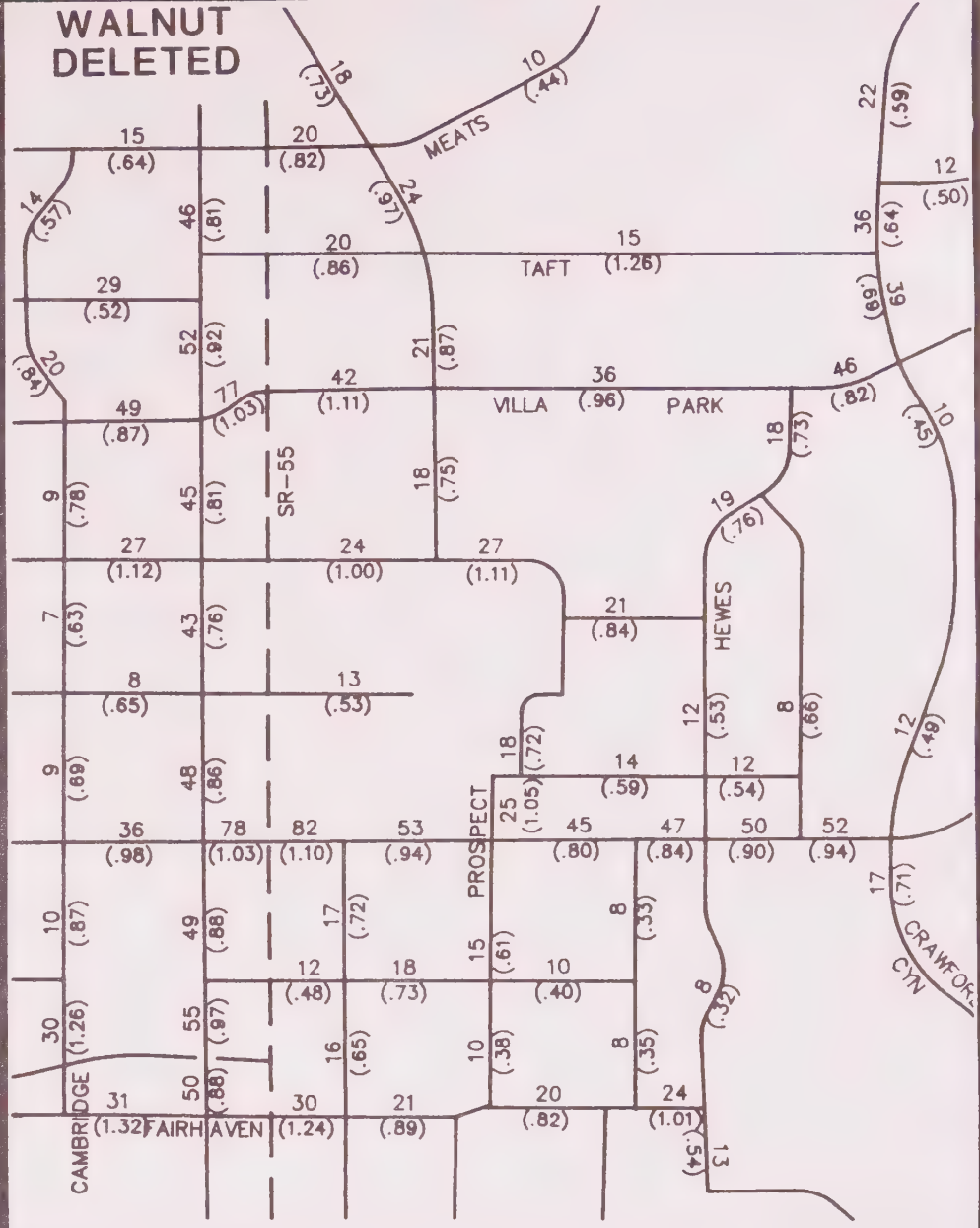
Villa Park Road

One means of increasing east-west capacity in the study area would be to widen Villa Park Road from four to six lanes from the SR-55 Freeway to Hewes Street in the City of Villa Park. Figure III-11 shows that this increase in capacity provides some degree of relief to parallel east-west facilities from Taft to Fairhaven. Since this improvement is currently part of the county's MPAH, and is shown here to benefit the surrounding circulation system, it is included in the recommended system presented in the following chapter.

AUGMENTED MPAH



WALNUT DELETED



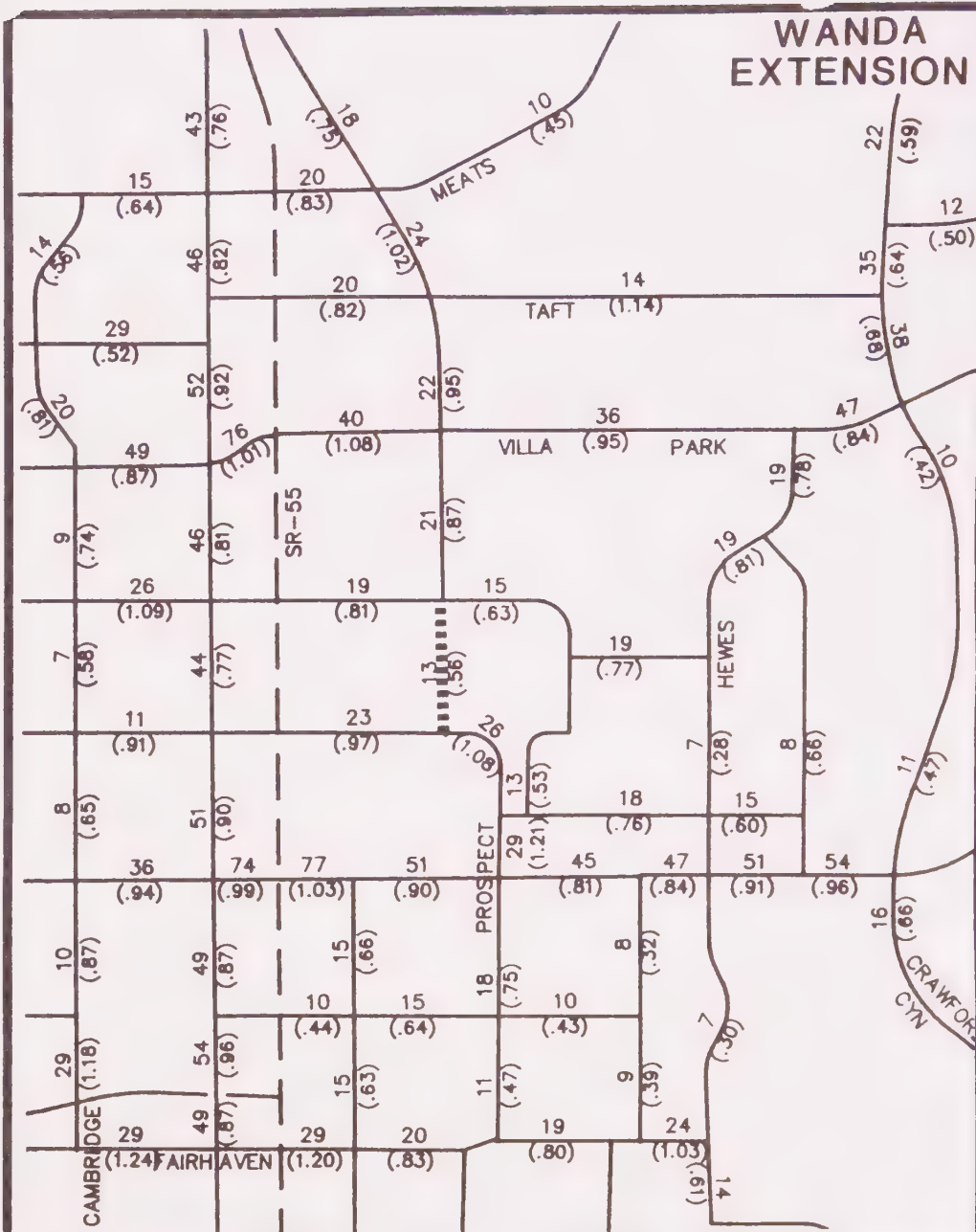
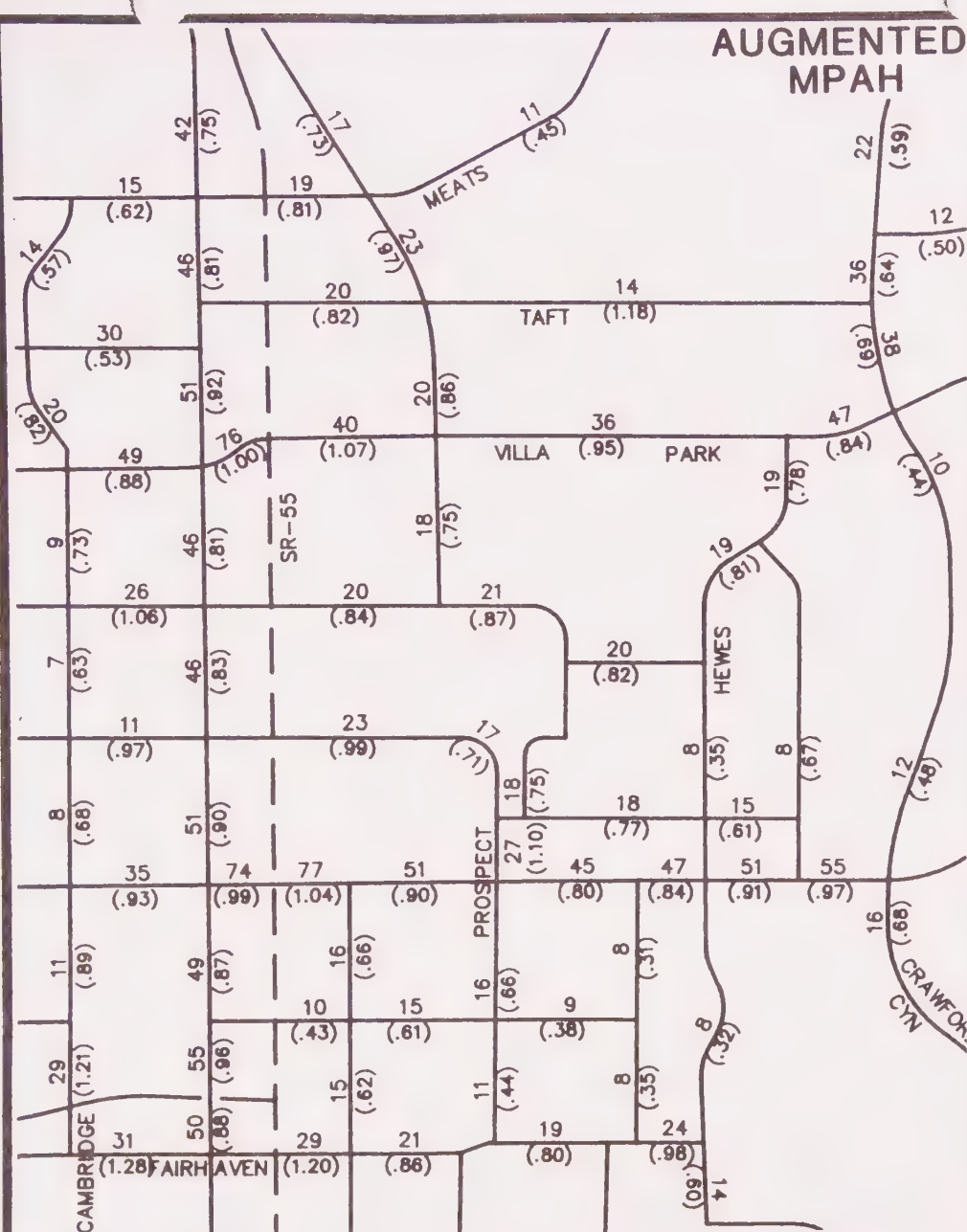
Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure III-9

POST-2010 ADT COMPARISON
- WALNUT DELETED



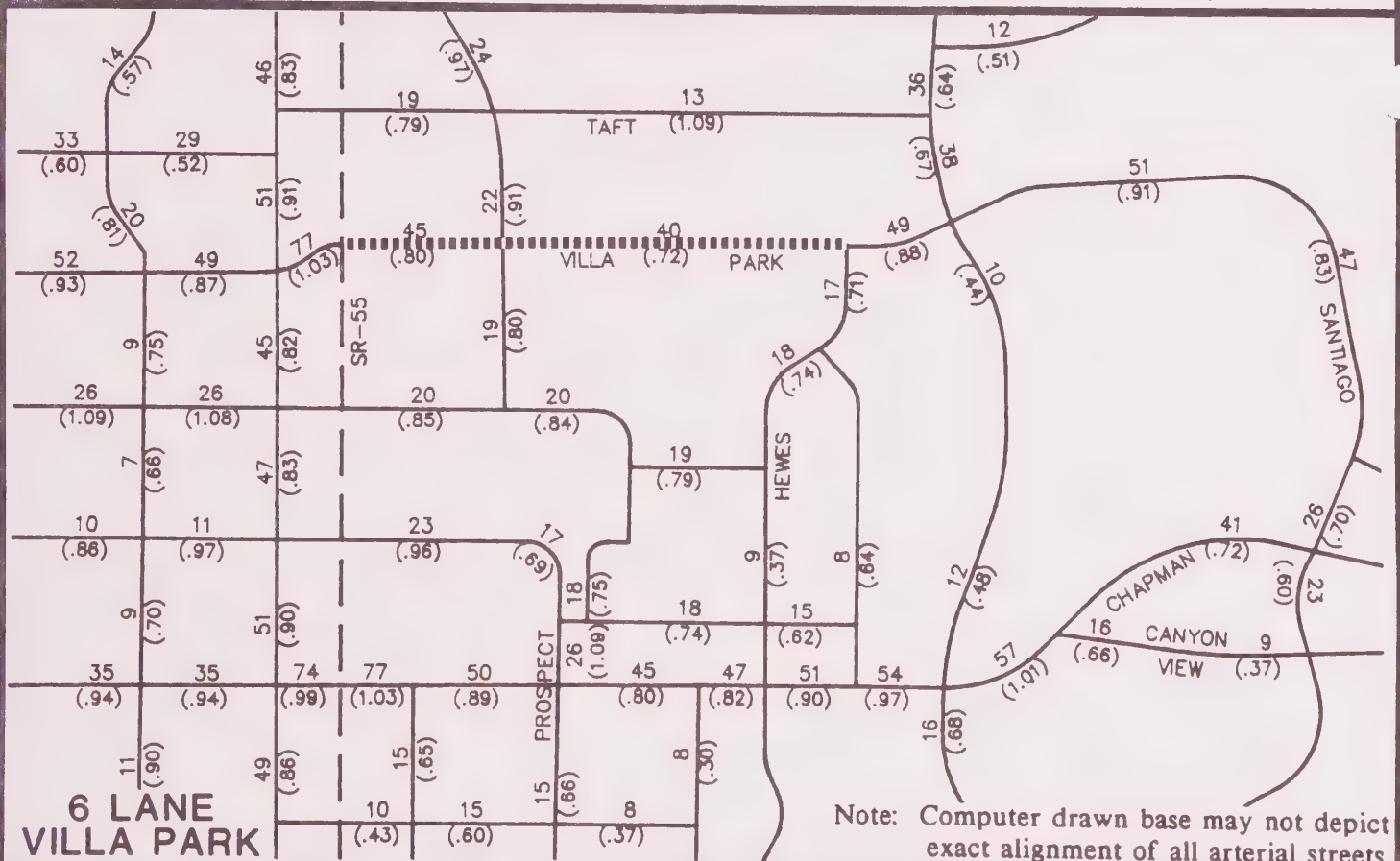
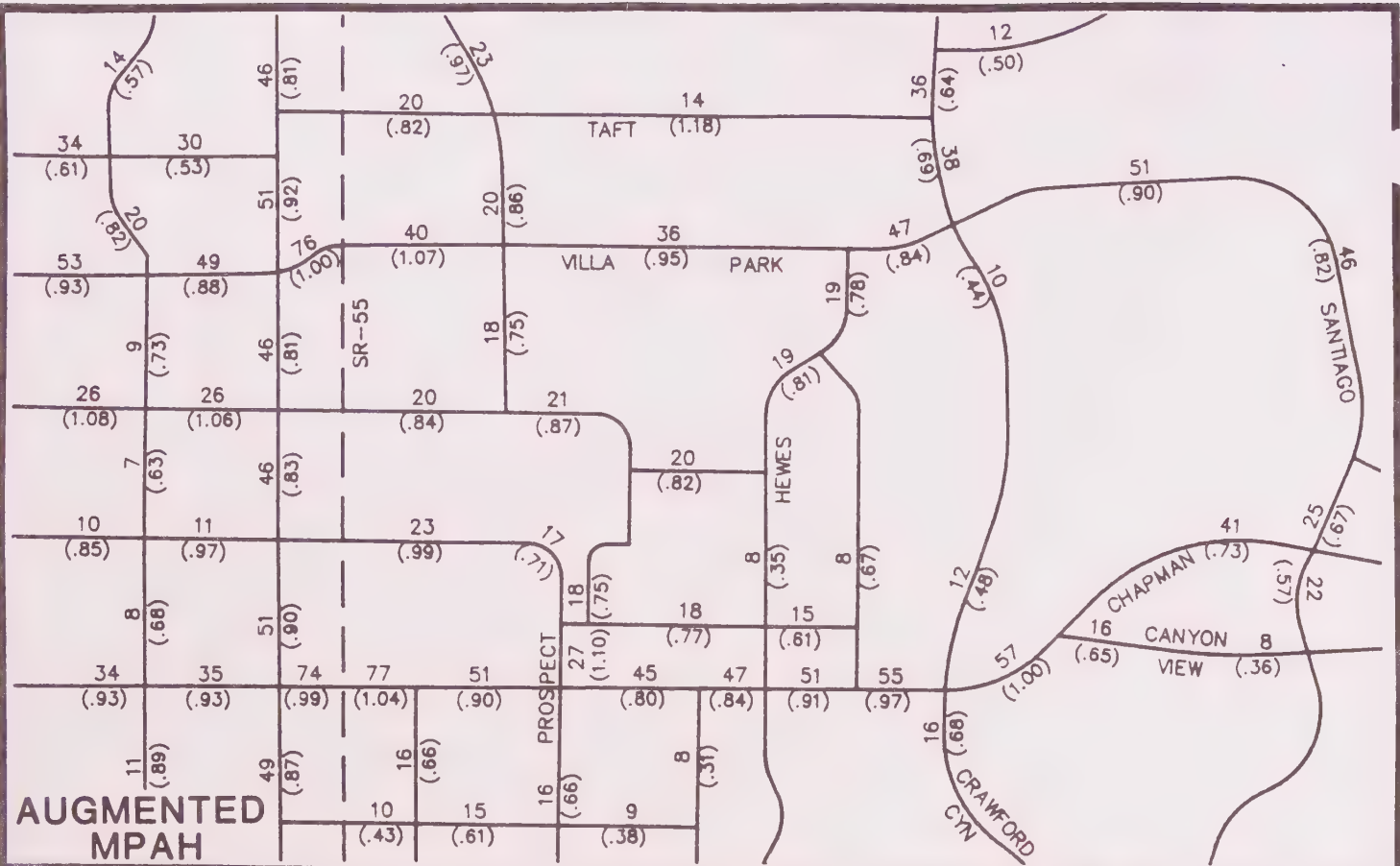
Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure III-10

POST-2010 ADT COMPARISON
- WANDA EXTENSION



Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX	ADT (000's)
(Y.YY)	Volume/Capacity Ratio

Figure III-11

POST-2010 ADT COMPARISON - 6 LANE VILLA PARK

IV. RECOMMENDED CIRCULATION SYSTEM

This chapter presents a set of recommendations for the city's General Plan circulation system. They are based on the analysis results presented in the previous chapter, and show how the General Plan land uses can be served.

ENHANCED INTERSECTIONS

The previous chapter showed that even with the MPAH circulation system plus augmentations in certain locations, there was inadequate capacity to carry the forecast traffic for Post-2010. One way of providing additional capacity is through the use of enhanced intersections. This involves increasing the number of lanes at the intersection beyond what would typically be provided under its standard classification, and generally requires some right-of-way acquisition at the intersection to provide for these additional lanes.



Appendix B shows some examples of intersection modifications, although it must be recognized that each location would be treated individually. Because an enhanced intersection provides additional capacity on the actual circulation link itself (the capacity limitations of a circulation link are generally the intersections), such intersection treatment increases overall system capacity.

For the purpose of this analysis, the following increases in capacity have been assumed for modified intersections:

	BASIC ADT CAPACITY	CAPACITY INCREASE	ENHANCED ADT CAPACITY
Enhanced Major	56,300	10%	61,900
Enhanced Primary	37,500	15%	43,100
Enhanced Secondary	24,000	15%	27,600

The set of potential enhanced intersections used in this analysis are shown in Figure IV-1. Also shown are the arterial locations that qualify for capacity increases as a result of the intersection enhancement.

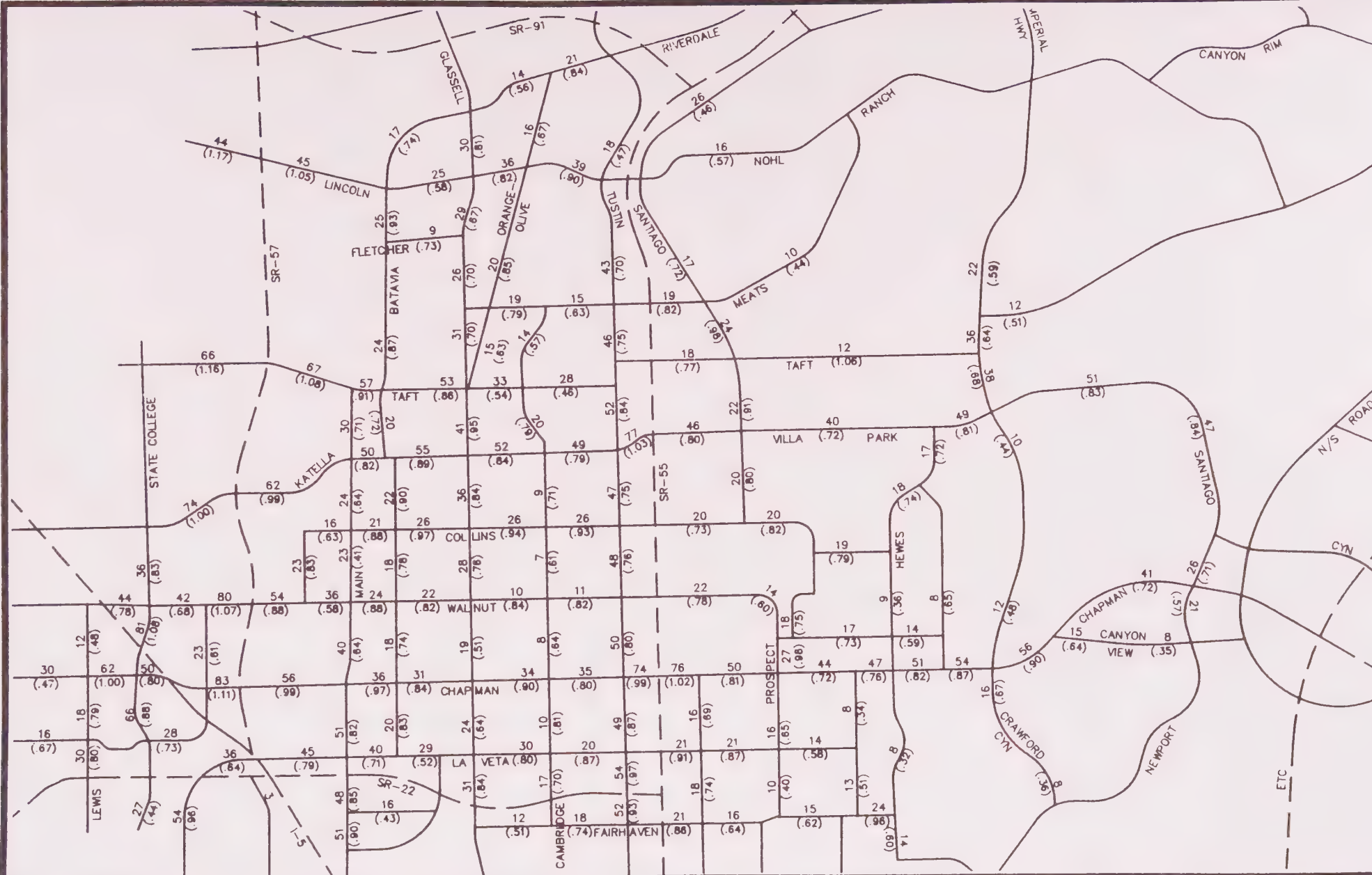
POST-2010 ENHANCED INTERSECTIONS

 Enhanced Intersection Location
 Facilities With Increased ADT Capacities Due To Enhanced Intersections

RECOMMENDED CIRCULATION SYSTEM

Post-2010 ADT volumes on the recommended circulation system are illustrated in Figure IV-2, together with the volume/capacity ratios. A summary of arterial locations operating above LOS "D" is presented in Figure IV-3. The recommended system includes the augmented MPAH plus the La Veta extension and six-lane Villa Park Road discussed in the previous chapter, together with the set of enhanced intersections described above.

III-24



Note: Computer drawn base may not depict exact alignment of all arterial streets

LEGEND

XX ADT (000's)
(Y.YY) Volume/Capacity Ratio

Figure IV-2

POST-2010 RECOMMENDED CIRCULATION
SYSTEM ADT VOLUMES



AUSTIN-FOUST ASSOCIATES, INC.



LEGEND

- X.XX Volume/Capacity Ratio
- V/C > 1.00 (LOS F)
- - - V/C 0.91-1.00 (LOS E)

Figure IV-3

POST-2010 RECOMMENDED SYSTEM
ADT LOS SUMMARY

APPENDIX A

LAND USE AND TRIP GENERATION

TRIP GENERATION RATES

Trip generation rates used for analyzing development in the Orange area have been compiled from several sources. Table A-1 summarizes the peak hour and ADT trip generation rates, and the following discusses the derivation for each category.

1. Residential-Low

ADT trip generation rate of 10.00 trips per dwelling unit (DU) and the corresponding peak hour trip generation rates were taken from the City of Irvine's Transportation Analysis Program (ITAP). AM peak hour inbound (IB) and outbound (OB) rates are .20 and .60, respectively, and PM peak hour IB and OB rates are .60 and .40, respectively.

2. Residential-Medium

ADT trip generation rate of 8.60 trips per DU and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .54 and .18, respectively, and PM peak hour IB and OB rates are .54 and .43, respectively.

3. Residential-Medium/High

ADT trip generation rate of 7.10 trips per DU and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .45 and .15, respectively, and PM peak hour IB and OB rates are .45 and .36, respectively.

4. Residential-High/Apartment

ADT trip generation rate of 6.30 trips per DU and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .10 and .40, respectively, and PM peak hour IB and OB rates are .40 and .20, respectively.

5. Mobile Home

ADT trip generation rate of 3.39 trips per DU and the corresponding peak hour trip generation rates were taken from the Institute of Transportation Engineers' (ITE) "Trip Generation." AM peak hour IB and OB rates are .05 and .22, respectively, and PM peak hour IB and OB rates are .23 and .13, respectively.

Table A-1

TRIP RATE SUMMARY

LU TYPE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
		IN	OUT	TOTAL	IN	OUT	TOTAL	
1. Res - Low	DU	0.20	0.60	0.80	0.60	0.40	1.00	10.00
2. Res - Medium	DU	0.54	0.18	0.72	0.54	0.43	0.97	8.60
3. Res - Med-High	DU	0.45	0.15	0.60	0.45	0.36	0.81	7.10
4. Res - High/Apt.	DU	0.10	0.40	0.50	0.40	0.20	0.60	6.30
5. Mobile Home	DU	0.05	0.22	0.27	0.23	0.13	0.36	3.39
6. Single-Family Res.	DU	0.20	0.60	0.80	0.60	0.40	1.00	10.00
7. Multi-Family Res.	DU	0.20	0.50	0.70	0.40	0.30	0.70	8.00
8. Hillside Res. (EO)	DU	0.20	0.80	1.00	0.80	0.40	1.20	12.00
9. General Commercial	TSF	0.90	0.80	1.70	2.90	3.10	6.00	70.00
10. Regional Commerical	TSF	0.40	0.20	0.60	1.40	1.50	2.90	35.00
11. Office	TSF	1.90	0.30	2.20	0.60	1.70	2.30	13.00
12. Medical Office	TSF	0.91	0.72	1.63	0.98	2.65	3.63	34.17
13. Industrial	TSF	0.84	0.12	0.96	0.12	0.91	1.03	6.97
14. Industrial Park	TSF	0.76	0.17	0.93	0.20	0.77	0.97	6.97
15. R&D	TSF	0.90	0.10	1.00	0.30	1.10	1.40	10.30
16. Hotel	ROOM	0.50	0.30	0.80	0.40	0.40	0.80	12.00
17. Retail Emp. (1987)	EMP	0.60	0.14	0.74	0.51	0.74	1.25	13.15
Retail Emp. (Post-2010)	EMP	0.60	0.14	0.74	0.51	0.74	1.25	14.45
18. Total Emp. (1987)	EMP	0.23	0.03	0.26	0.07	0.18	0.25	2.40
Total Emp. (Post-2010)	EMP	0.23	0.03	0.26	0.07	0.18	0.25	2.60
19. Hospital	BED	0.77	0.30	1.07	0.46	0.76	1.22	11.75
20. Church	TSF	0.08	0.03	0.11	0.34	0.30	0.64	7.70
21. Library	TSF	1.55	1.56	3.11	3.28	2.92	6.20	45.50
22. Fire Station	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	20.00
23. Cemetary	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	4.16
24. Elementary School	STU	0.17	0.09	0.26	0.10	0.14	0.24	1.03
25. Junior High School	STU	0.17	0.09	0.26	0.10	0.14	0.24	1.03
26. High School	STU	0.22	0.07	0.29	0.13	0.11	0.24	1.39
27. Com. Recreation	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	40.00
28. Park	ACRE	0.20	0.00	0.20	0.20	0.20	0.40	5.00
29. County Facil. (SG)	UNIT	0.56	0.16	0.72	0.10	0.84	0.94	10.00
30. Golf Course	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	6.00
31. Maintenance Yard	ACRE	0.00	0.00	0.00	0.00	0.00	0.00	20.00
32. Collge	STU	0.15	0.03	0.18	0.04	0.08	0.12	1.55
33. Government Office	TSF	4.94	0.94	5.88	8.16	2.87	11.03	68.93
34. Specialty Commercial	TSF	0.40	0.20	0.60	1.40	1.50	2.90	35.00

6. Single Family Residential

ADT trip generation rate of 10.00 trips per DU and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .20 and .60, respectively, and PM peak hour IB and OB rates are .60 and .40, respectively.

7. Multi-Family Residential

ADT trip generation rate of 8.00 trips per DU unit was taken from the Orange County Transportation Analysis Model (OCTAM). Peak hour trip generation rates were derived from ITAP's peak hour rates for low density housing. ITAP's AM peak hour IB and OB rates of .20 and .60, respectively, were changed to .20 and .50, respectively, and ITAP's PM peak hour IB and OB rates of .60 and .40, respectively, were changed to .40 and .30, respectively.

8. Hillside Residential (East Orange)

ADT trip generation rate of 12.00 trips per DU was derived from ITAP's ADT rate of 11.00 for rural residential. Peak hour trip generation rates were likewise derived from ITAP's peak hour rates for rural residential. ITAP's AM peak hour IB and OB rates of .30 and .66, respectively, were changed to .20 and .80, respectively. PM peak hour IB and OB rates of .77 and .44, respectively, were changed to .80 and .40, respectively.

9. General Commercial

ADT trip generation rate of 70.00 trips per thousand square feet (TSF) and the corresponding peak hour trip generation rates were taken from ITAP. ITAP's AM peak hour IB rate of 1.30 was changed to .90, and the ITAP OB rate of .80 is used here. PM peak hour IB and OB rates are 2.90 and 3.10, respectively.

10. Regional Commercial

ADT trip generation rate of 35.00 trips per TSF and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .40 and .20, respectively, and PM peak hour IB and OB rates are 1.40 and 1.50, respectively.

11. Office

ADT trip generation rate of 13.00 trips per TSF and the corresponding peak hour trip generation rates were taken from the Southwest Orange Traffic Model rates. AM peak hour IB and OB rates are 1.90 and .30, respectively, and PM peak hour IB and OB rates are .60 and 1.70, respectively.

12. Medical Office

ADT trip generation rate of 34.17 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .91 and .72, respectively, and PM peak hour IB and OB rates are .98 and 2.65, respectively.

13. Industrial

ADT trip generation rate of 6.97 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .84 and .12, respectively, and PM peak hour IB and OB rates are .12 and .91, respectively.

14. Industrial Park

ADT trip generation rate of 6.97 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .76 and .17, respectively, and PM peak hour IB and OB rates are .20 and .77, respectively.

15. Research and Development (R&D)

ADT trip generation rate of 10.30 trips per TSF and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .90 and .10, respectively, and were derived from production and attraction splitting factors using ITAP purpose splits. PM peak hour IB and OB rates are .30 and 1.10, respectively.

16. Hotel

ADT trip generation rate of 12.00 trips per room and the corresponding peak hour trip generation rates were taken from ITAP. ITAP's AM peak hour IB rate of .70 was changed to .50, and the ITAP OB rate of .30 is used here. PM peak hour IB and OB rates are both .40.

17. Retail Employment

ADT trip generation rate of 13.15 trips per employee was taken from OCTAM (for the Post-2010 analysis, the ADT trip rate is adjusted to 14.45 trips per employee). Peak hour trip generation rates were derived from production and attraction splitting factors using ITAP purpose splits. AM peak hour IB and OB rates are .60 and .14, respectively, and PM peak hour IB and OB rates are .51 and .74, respectively.

18. Total Employment

ADT trip generation rate of 2.40 trips per employee was taken from OCTAM (for the Post-2010 analysis, the ADT trip rate is adjusted to 2.60 trips per employee). Peak hour trip

generation rates were derived from production and attraction splitting factors using ITAP purpose splits. AM peak hour IB and OB rates are .23 and .03, respectively, and PM peak hour IB and OB rates are .07 and .18, respectively.

19. Hospital

ADT trip generation rate of 11.75 trips per bed and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .77 and .30, respectively, and PM peak hour IB and OB rates are .46 and .76, respectively.

20. Church

ADT trip generation rate of 7.70 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .08 and .03, respectively, and PM peak hour IB and OB rates are .34 and .30, respectively.

21. Library

ADT trip generation rate of 45.50 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are 1.55 and 1.56, respectively, and PM peak hour IB and OB rates are 3.28 and 2.92, respectively.

22. Fire Station

ADT trip generation rate of 20.00 trips per acre was derived from special traffic studies for fire stations. No peak hour trips are assumed for this land use category.

23. Cemetery

ADT trip generation rate of 4.16 trips per acre was taken from ITE. No peak hour trips are assumed for this land use category.

24. Elementary School

ADT trip generation rate of 1.03 trips per student and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .17 and .09, respectively, and PM peak hour IB and OB rates are .10 and .14, respectively.

25. Junior High School

ADT trip generation rate of 1.03 trips per student and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .17 and .09, respectively, and PM peak hour IB and OB rates are .10 and .14, respectively.

26. High School

ADT trip generation rate of 1.39 trips per student and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .22 and .07, respectively, and PM peak hour IB and OB rates are .13 and .11, respectively.

27. Commercial - Recreation

ADT trip generation rate of 40.0 trips per acre was taken from ITAP. No peak hour trips are assumed for this land use category.

28. Park

ADT trip generation rate of 5.00 trips per acre and the corresponding peak hour trip generation rates were taken from ITAP. AM peak hour IB and OB rates are .20 and 0, respectively, and PM peak hour IB and OB rates are both .20.

29. County Facilities (Special Generator - ADT/10)

ADT trip generation rate of 10.0 trips per unit is based on actual trip generation at the site. The total known ADT is divided by 10 to create a unit of measurement for this land use category. Peak hour trip generation rates are likewise based on actual trip generation. AM peak hour IB and OB rates are .56 and .16, respectively, and PM peak hour IB and OB rates are .10 and .84, respectively.

30. Golf Course

ADT trip generation rate of 6.00 trips per acre was taken from ITAP. No peak hour trips are assumed for this land use category.

31. Maintenance Yard

ADT trip generation rate of 20.0 trips per acre was derived from comparable warehousing and storage facility rates. No peak hour trips are assumed for this land use category.

32. College

ADT trip generation rate of 1.55 trips per student and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are .15 and .03, respectively, and the PM peak hour IB and OB rates are .04 and .08, respectively.

33. Government Office

ADT trip generation rate of 68.93 trips per TSF and the corresponding peak hour trip generation rates were taken from ITE. AM peak hour IB and OB rates are 4.94 and .94, respectively, and PM peak hour IB and OB rates are 8.16 and 2.87, respectively.

34. Specialty Commercial

ADT trip generation rate of 35.00 trips per TSF was derived from ITE's ADT rate of 40.68. Peak hour rates were derived from single studies for specialty retail, suggesting trip generation characteristics about 50 percent less than general commercial uses. AM peak hour IB and OB rates are .40 and .20, respectively, and PM peak hour IB and OB rates are 1.40 and 1.50, respectively.

LAND USE AND TRIP GENERATION SUMMARIES

For traffic forecasting purposes, land use data has been specified according to the 188 traffic zones designated in the analysis area and illustrated in Figure A-1.

The following tables summarize the 1987 and Post-2010 land use by traffic area zone, including the corresponding trip generation used in the OTM.

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
1	6. Single-Family Res.	1262.00 DU	252	757	1010	757	505	1262	12620
1	7. Multi-Family Res.	70.00 DU	14	35	49	28	21	49	560
1	17. Retail Employment	150.00 EMP	90	21	111	77	111	188	1973
1	18. Total Employment	1474.00 EMP	339	44	383	103	265	369	3538
1	TOTAL		695	857	1553	965	902	1867	18690
2	1. Res - Low	107.00 DU	21	64	86	64	43	107	1070
2	9. General Commercial	18.95 TSF	17	15	32	55	59	114	1327
2	24. Elementary School	597.00 STU	101	54	155	60	84	143	615
2	TOTAL		140	133	273	179	185	364	3011
3	6. Single-Family Res.	857.00 DU	171	514	686	514	343	857	8570
3	7. Multi-Family Res.	346.00 DU	69	173	242	138	104	242	2768
3	17. Retail Employment	115.00 EMP	69	16	85	59	85	144	1512
3	18. Total Employment	592.00 EMP	136	18	154	41	107	148	1421
3	TOTAL		446	721	1167	753	638	1391	14271
4	6. Single-Family Res.	1240.00 DU	248	744	992	744	496	1240	12400
4	7. Multi-Family Res.	199.00 DU	40	100	139	80	60	139	1592
4	17. Retail Employment	214.00 EMP	128	30	158	109	158	268	2814
4	18. Total Employment	685.00 EMP	158	21	178	48	123	171	1644
4	TOTAL		574	894	1468	981	837	1818	18450
5	6. Single-Family Res.	744.00 DU	149	446	595	446	298	744	7440
5	7. Multi-Family Res.	119.00 DU	24	60	83	48	36	83	952
5	17. Retail Employment	128.00 EMP	77	18	95	65	95	160	1683
5	18. Total Employment	411.00 EMP	95	12	107	29	74	103	986
5	TOTAL		344	536	880	588	502	1090	11062
6	6. Single-Family Res.	496.00 DU	99	298	397	298	198	496	4960
6	7. Multi-Family Res.	79.00 DU	16	40	55	32	24	55	632
6	17. Retail Employment	85.00 EMP	51	12	63	43	63	106	1118
6	18. Total Employment	274.00 EMP	63	8	71	19	49	69	658
6	TOTAL		229	357	586	392	334	726	7367
7	6. Single-Family Res.	780.00 DU	156	468	624	468	312	780	7800
7	7. Multi-Family Res.	623.00 DU	125	312	436	249	187	436	4984
7	17. Retail Employment	258.00 EMP	155	36	191	132	191	323	3393
7	18. Total Employment	900.00 EMP	207	27	234	63	162	225	2160
7	TOTAL		642	843	1485	912	852	1764	18337
8	6. Single-Family Res.	154.00 DU	31	92	123	92	62	154	1540
8	7. Multi-Family Res.	128.00 DU	26	64	90	51	38	90	1024
8	18. Total Employment	110.00 EMP	25	3	29	8	20	28	264
8	TOTAL		82	160	241	151	120	271	2828
9	6. Single-Family Res.	51.00 DU	10	31	41	31	20	51	510
9	7. Multi-Family Res.	43.00 DU	9	22	30	17	13	30	344
9	18. Total Employment	37.00 EMP	9	1	10	3	7	9	89
9	TOTAL		27	53	81	50	40	90	943
10	6. Single-Family Res.	195.00 DU	39	117	156	117	78	195	1950

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
10	7. Multi-Family Res.	174.00 DU	35	87	122	70	52	122	1392
10	18. Total Employment	454.00 EMP	104	14	118	32	82	114	1090
10	TOTAL		178	218	396	218	212	430	4432
11	6. Single-Family Res.	195.00 DU	39	117	156	117	78	195	1950
11	7. Multi-Family Res.	174.00 DU	35	87	122	70	52	122	1392
11	18. Total Employment	454.00 EMP	104	14	118	32	82	114	1090
11	TOTAL		178	218	396	218	212	430	4432
18	28. Park	8.50 ACRE	2	0	2	2	2	3	43
18	TOTAL		2	0	2	2	2	3	43
19	1. Res - Low	806.00 DU	161	484	645	484	322	806	8060
19	3. Res - Med-High	1.00 DU	0	0	1	0	0	1	7
19	9. General Commercial	0.65 TSF	1	1	1	2	2	4	46
19	11. Office	7.62 TSF	14	2	17	5	13	18	99
19	13. Industrial	21.78 TSF	18	3	21	3	20	22	152
19	27. Com. Recreation	0.10 ACRE	0	0	0	0	0	0	4
19	28. Park	19.00 ACRE	4	0	4	4	4	8	95
19	TOTAL		199	489	688	497	361	858	8462
20	1. Res - Low	195.00 DU	39	117	156	117	78	195	1950
20	3. Res - Med-High	176.00 DU	79	26	106	79	63	143	1250
20	11. Office	22.87 TSF	43	7	50	14	39	53	297
20	27. Com. Recreation	6.40 ACRE	0	0	0	0	0	0	256
20	TOTAL		162	150	312	210	180	390	3753
21	1. Res - Low	121.00 DU	24	73	97	73	48	121	1210
21	11. Office	11.98 TSF	23	4	26	7	20	28	156
21	27. Com. Recreation	1.30 ACRE	0	0	0	0	0	0	52
21	TOTAL		47	76	123	80	69	149	1418
22	1. Res - Low	48.00 DU	10	29	38	29	19	48	480
22	TOTAL		10	29	38	29	19	48	480
23	1. Res - Low	4.00 DU	1	2	3	2	2	4	40
23	TOTAL		1	2	3	2	2	4	40
24	1. Res - Low	17.00 DU	3	10	14	10	7	17	170
24	11. Office	2.18 TSF	4	1	5	1	4	5	28
24	TOTAL		8	11	18	12	11	22	198
39	1. Res - Low	18.00 DU	4	11	14	11	7	18	180
39	3. Res - Med-High	2.00 DU	1	0	1	1	1	2	14
39	TOTAL		5	11	16	12	8	20	194
44	1. Res - Low	3.00 DU	1	2	2	2	1	3	30
44	3. Res - Med-High	121.00 DU	54	18	73	54	44	98	859
44	5. Mobile Home	2.00 DU	0	0	1	0	0	1	7
44	9. General Commercial	35.94 TSF	32	29	61	104	111	216	2516
44	11. Office	41.38 TSF	79	12	91	25	70	95	538
44	28. Park	0.10 ACRE	0	0	0	0	0	0	1
44	TOTAL		166	62	228	186	227	413	3950

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
45	1. Res - Low	372.00 DU	74	223	298	223	149	372	3720
45	2. Res - Medium	63.00 DU	34	11	45	34	27	61	542
45	5. Mobile Home	38.00 DU	2	8	10	9	5	14	129
45	9. General Commercial	25.48 TSF	23	20	43	74	79	153	1784
45	11. Office	1.09 TSF	2	0	2	1	2	3	14
45	13. Industrial	52.27 TSF	44	6	50	6	48	54	364
45	TOTAL		179	270	449	347	309	656	6553
46	1. Res - Low	462.00 DU	92	277	370	277	185	462	4620
46	3. Res - Med-High	256.00 DU	115	38	154	115	92	207	1818
46	9. General Commercial	28.10 TSF	25	22	48	81	87	169	1967
46	11. Office	8.71 TSF	17	3	19	5	15	20	113
46	13. Industrial	33.76 TSF	28	4	32	4	31	35	235
46	28. Park	7.80 ACRE	2	0	2	2	2	3	39
46	TOTAL		279	345	624	485	411	896	8792
47	1. Res - Low	679.00 DU	136	407	543	407	272	679	6790
47	2. Res - Medium	37.00 DU	20	7	27	20	16	36	318
47	3. Res - Med-High	7.00 DU	3	1	4	3	3	6	50
47	9. General Commercial	49.01 TSF	44	39	83	142	152	294	3431
47	11. Office	51.19 TSF	97	15	113	31	87	118	665
47	13. Industrial	35.94 TSF	30	4	35	4	33	37	251
47	20. Church	21.78 TSF	2	1	2	7	7	14	168
47	28. Park	19.70 ACRE	4	0	4	4	4	8	99
47	TOTAL		336	475	811	619	572	1191	11771
48	1. Res - Low	257.00 DU	51	154	206	154	103	257	2570
48	9. General Commercial	9.15 TSF	8	7	16	27	28	55	641
48	28. Park	2.30 ACRE	0	0	0	0	0	1	12
48	TOTAL		60	162	222	181	132	313	3222
49	1. Res - Low	303.00 DU	61	182	242	182	121	303	3030
49	3. Res - Med-High	10.00 DU	5	2	6	5	4	8	71
49	9. General Commercial	13.72 TSF	12	11	23	40	43	82	960
49	11. Office	2.18 TSF	4	1	5	1	4	5	28
49	TOTAL		82	195	277	227	171	398	4090
50	1. Res - Low	320.00 DU	64	192	256	192	128	320	3200
50	2. Res - Medium	10.00 DU	5	2	7	5	4	10	86
50	3. Res - Med-High	77.00 DU	35	12	46	35	28	62	547
50	9. General Commercial	128.72 TSF	116	103	219	373	399	772	9010
50	11. Office	14.16 TSF	27	4	31	8	24	33	184
50	13. Industrial	3.27 TSF	3	0	3	0	3	3	23
50	20. Church	42.47 TSF	3	1	5	14	13	27	327
50	24. Elementary School	597.00 STU	101	54	155	60	84	143	615
50	28. Park	0.30 ACRE	0	0	0	0	0	0	2
50	TOTAL		354	368	722	688	682	1371	13993
51	1. Res - Low	2.00 DU	0	1	2	1	1	2	20
51	3. Res - Med-High	164.00 DU	74	25	98	74	59	133	1164
51	5. Mobile Home	87.00 DU	4	19	23	20	11	31	295
51	9. General Commercial	210.39 TSF	189	168	358	610	652	1262	14727

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
51	11. Office	26.14 TSF	50	8	58	16	44	60	340
51	20. Church	4.36 TSF	0	0	0	1	1	3	34
51	TOTAL		318	221	539	722	769	1491	16580
52	1. Res - Low	265.00 DU	53	159	212	159	106	265	2650
52	3. Res - Med-High	48.00 DU	22	7	29	22	17	39	341
52	9. General Commercial	18.95 TSF	17	15	32	55	59	114	1327
52	11. Office	37.03 TSF	70	11	81	22	63	85	481
52	27. Com. Recreation	1.13 ACRE	0	0	0	0	0	0	45
52	TOTAL		162	192	354	258	245	503	4844
53	1. Res - Low	1616.00 DU	323	970	1293	970	646	1616	16160
53	28. Park	2.50 ACRE	1	0	1	1	1	1	13
53	TOTAL		324	970	1293	970	647	1617	16173
55	1. Res - Low	560.00 DU	112	336	448	336	224	560	5600
55	9. General Commercial	8.49 TSF	8	7	14	25	26	51	594
55	11. Office	6.54 TSF	12	2	14	4	11	15	85
55	24. Elementary School	626.00 STU	106	56	163	63	88	150	645
55	TOTAL		238	401	640	427	349	776	6924
56	1. Res - Low	85.00 DU	17	51	68	51	34	85	850
56	2. Res - Medium	10.00 DU	5	2	7	5	4	10	86
56	3. Res - Med-High	64.00 DU	29	10	38	29	23	52	454
56	9. General Commercial	456.73 TSF	411	365	776	1325	1416	2740	31971
56	11. Office	28.32 TSF	54	8	62	17	48	65	368
56	20. Church	58.81 TSF	5	2	6	20	18	38	453
56	26. High School	1481.00 STU	326	104	429	193	163	355	2059
56	TOTAL		847	542	1388	1639	1706	3345	36241
57	1. Res - Low	349.00 DU	70	209	279	209	140	349	3490
57	2. Res - Medium	65.00 DU	35	12	47	35	28	63	559
57	3. Res - Med-High	112.00 DU	50	17	67	50	40	91	795
57	9. General Commercial	52.27 TSF	47	42	89	152	162	314	3659
57	11. Office	105.63 TSF	201	32	232	63	180	243	1373
57	13. Industrial	5.45 TSF	5	1	5	1	5	6	38
57	20. Church	20.69 TSF	2	1	2	7	6	13	159
57	TOTAL		409	313	722	518	561	1078	10074
58	1. Res - Low	384.00 DU	77	230	307	230	154	384	3840
58	2. Res - Medium	11.00 DU	6	2	8	6	5	11	95
58	3. Res - Med-High	187.00 DU	84	28	112	84	67	151	1328
58	9. General Commercial	138.52 TSF	125	111	235	402	429	831	9696
58	11. Office	4.36 TSF	8	1	10	3	7	10	57
58	13. Industrial	1.09 TSF	1	0	1	0	1	1	8
58	20. Church	16.34 TSF	1	0	2	6	5	10	126
58	24. Elementary School	880.00 STU	150	79	229	88	123	211	906
58	TOTAL		452	452	904	819	792	1610	16055
59	1. Res - Low	2.00 DU	0	1	2	1	1	2	20
59	3. Res - Med-High	217.00 DU	98	33	130	98	78	176	1541
59	9. General Commercial	174.46 TSF	157	140	297	506	541	1047	12212

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
59	13. Industrial	15.25 TSF	13	2	15	2	14	16	106
59	16. Hotel	12.00 ROOM	6	4	10	5	5	10	144
59	20. Church	59.90 TSF	5	2	7	20	18	38	461
59	24. Elementary School	421.00 STU	72	38	109	42	59	101	434
59	TOTAL		350	218	569	674	715	1389	14918
60	1. Res - Low	42.00 DU	8	25	34	25	17	42	420
60	9. General Commercial	135.91 TSF	122	109	231	394	421	815	9514
60	11. Office	2.18 TSF	4	1	5	1	4	5	28
60	13. Industrial	58.81 TSF	49	7	56	7	54	61	410
60	25. Junior High School	601.00 STU	102	54	156	60	84	144	619
60	TOTAL		286	196	482	488	579	1067	10991
61	1. Res - Low	311.00 DU	62	187	249	187	124	311	3110
61	2. Res - Medium	3.00 DU	2	1	2	2	1	3	26
61	24. Elementary School	139.00 STU	24	13	36	14	19	33	143
61	TOTAL		87	200	287	202	145	347	3279
62	1. Res - Low	529.00 DU	106	317	423	317	212	529	5290
62	11. Office	15.25 TSF	29	5	34	9	26	35	198
62	24. Elementary School	559.00 STU	95	50	145	56	78	134	576
62	TOTAL		230	372	602	382	316	698	6064
63	1. Res - Low	4.00 DU	1	2	3	2	2	4	40
63	2. Res - Medium	49.00 DU	26	9	35	26	21	48	421
63	3. Res - Med-High	271.00 DU	122	41	163	122	98	220	1924
63	5. Mobile Home	33.00 DU	2	7	9	8	4	12	112
63	9. General Commercial	172.50 TSF	155	138	293	500	535	1035	12075
63	11. Office	90.39 TSF	172	27	199	54	154	208	1175
63	16. Hotel	28.00 ROOM	14	8	22	11	11	22	336
63	25. Junior High School	701.00 STU	119	63	182	70	98	168	722
63	TOTAL		611	296	907	794	922	1716	16805
64	1. Res - Low	730.00 DU	146	438	584	438	292	730	7300
64	2. Res - Medium	4.00 DU	2	1	3	2	2	4	34
64	11. Office	8.72 TSF	17	3	19	5	15	20	113
64	24. Elementary School	385.00 STU	65	35	100	39	54	92	397
64	TOTAL		230	476	706	484	362	846	7844
66	1. Res - Low	262.00 DU	52	157	210	157	105	262	2620
66	11. Office	2.18 TSF	4	1	5	1	4	5	28
66	26. High School	1348.00 STU	297	94	391	175	148	324	1874
66	TOTAL		353	252	605	334	257	591	4522
67	1. Res - Low	121.00 DU	24	73	97	73	48	121	1210
67	2. Res - Medium	110.00 DU	59	20	79	59	47	107	946
67	3. Res - Med-High	220.00 DU	99	33	132	99	79	178	1562
67	9. General Commercial	136.56 TSF	123	109	232	396	423	819	9559
67	11. Office	116.52 TSF	221	35	256	70	198	268	1515
67	13. Industrial	5.45 TSF	5	1	5	1	5	6	38
67	19. Hospital	99.00 BED	76	30	106	46	75	121	1163
67	24. Elementary School	453.00 STU	77	41	118	45	63	109	467

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
67	28. Park	0.40 ACRE	0	0	0	0	0	0	2
67	TOTAL		685	341	1026	789	940	1729	16462
68	1. Res - Low	313.00 DU	63	188	250	188	125	313	3130
68	24. Elementary School	291.00 STU	49	26	76	29	41	70	300
68	TOTAL		112	214	326	217	166	383	3430
69	1. Res - Low	668.00 DU	134	401	534	401	267	668	6680
69	2. Res - Medium	56.00 DU	30	10	40	30	24	54	482
69	3. Res - Med-High	18.00 DU	8	3	11	8	6	15	128
69	9. General Commercial	27.44 TSF	25	22	47	80	85	165	1921
69	20. Church	10.89 TSF	1	0	1	4	3	7	84
69	TOTAL		198	436	633	522	386	909	9294
70	1. Res - Low	279.00 DU	56	167	223	167	112	279	2790
70	2. Res - Medium	40.00 DU	22	7	29	22	17	39	344
70	3. Res - Med-High	200.00 DU	90	30	120	90	72	162	1420
70	9. General Commercial	28.10 TSF	25	22	48	81	87	169	1967
70	11. Office	112.17 TSF	213	34	247	67	191	258	1458
70	20. Church	19.60 TSF	2	1	2	7	6	13	151
70	TOTAL		407	261	669	434	484	919	8130
71	1. Res - Low	1584.00 DU	317	950	1267	950	634	1584	15840
71	9. General Commercial	75.79 TSF	68	61	129	220	235	455	5305
71	11. Office	13.07 TSF	25	4	29	8	22	30	170
71	TOTAL		410	1015	1425	1178	891	2069	21315
72	1. Res - Low	308.00 DU	62	185	246	185	123	308	3080
72	5. Mobile Home	72.00 DU	4	16	19	17	9	26	244
72	9. General Commercial	10.45 TSF	9	8	18	30	32	63	732
72	TOTAL		75	209	284	232	165	397	4056
73	1. Res - Low	150.00 DU	30	90	120	90	60	150	1500
73	2. Res - Medium	19.00 DU	10	3	14	10	8	18	163
73	3. Res - Med-High	646.00 DU	291	97	388	291	233	523	4587
73	11. Office	1.09 TSF	2	0	2	1	2	3	14
73	TOTAL		333	191	524	392	303	694	6264
74	1. Res - Low	1546.00 DU	309	928	1237	928	618	1546	15460
74	3. Res - Med-High	2.00 DU	1	0	1	1	1	2	14
74	9. General Commercial	82.98 TSF	75	66	141	241	257	498	5809
74	11. Office	4.36 TSF	8	1	10	3	7	10	57
74	27. Com. Recreation	34.20 ACRE	0	0	0	0	0	0	1368
74	TOTAL		393	996	1389	1172	884	2056	22707
75	1. Res - Low	127.00 DU	25	76	102	76	51	127	1270
75	3. Res - Med-High	1.00 DU	0	0	1	0	0	1	7
75	9. General Commercial	0.65 TSF	1	1	1	2	2	4	46
75	11. Office	49.01 TSF	93	15	108	29	83	113	637
75	28. Park	8.50 ACRE	2	0	2	2	2	3	43
75	TOTAL		121	92	213	110	138	248	2002

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
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76	1. Res - Low	201.00 DU	40	121	161	121	80	201	2010
76	2. Res - Medium	9.00 DU	5	2	6	5	4	9	77
76	3. Res - Med-High	8.00 DU	4	1	5	4	3	6	57
76	9. General Commercial	1.31 TSF	1	1	2	4	4	8	92
76	20. Church	55.54 TSF	4	2	6	19	17	36	428
76	TOTAL		54	126	180	152	108	260	2664
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77	1. Res - Low	517.00 DU	103	310	414	310	207	517	5170
77	2. Res - Medium	3.00 DU	2	1	2	2	1	3	26
77	3. Res - Med-High	48.00 DU	22	7	29	22	17	39	341
77	9. General Commercial	88.21 TSF	79	71	150	256	273	529	6175
77	11. Office	16.34 TSF	31	5	36	10	28	38	212
77	13. Industrial	5.45 TSF	5	1	5	1	5	6	38
77	20. Church	55.54 TSF	4	2	6	19	17	36	428
77	TOTAL		246	396	642	619	548	1167	12389
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78	1. Res - Low	569.00 DU	114	341	455	341	228	569	5690
78	2. Res - Medium	2.00 DU	1	0	1	1	1	2	17
78	3. Res - Med-High	11.00 DU	5	2	7	5	4	9	78
78	9. General Commercial	1.31 TSF	1	1	2	4	4	8	92
78	11. Office	2.18 TSF	4	1	5	1	4	5	28
78	27. Com. Recreation	0.40 ACRE	0	0	0	0	0	0	16
78	TOTAL		125	345	470	353	240	593	5921
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79	1. Res - Low	422.00 DU	84	253	338	253	169	422	4220
79	2. Res - Medium	23.00 DU	12	4	17	12	10	22	198
79	3. Res - Med-High	79.00 DU	36	12	47	36	28	64	561
79	9. General Commercial	86.90 TSF	78	70	148	252	269	521	6083
79	28. Park	1.80 ACRE	0	0	0	0	0	1	9
79	TOTAL		211	339	550	554	477	1030	11071
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80	1. Res - Low	604.00 DU	121	362	483	362	242	604	6040
80	TOTAL		121	362	483	362	242	604	6040
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81	1. Res - Low	420.00 DU	84	252	336	252	168	420	4200
81	2. Res - Medium	56.00 DU	30	10	40	30	24	54	482
81	3. Res - Med-High	32.00 DU	14	5	19	14	12	26	227
81	9. General Commercial	33.32 TSF	30	27	57	97	103	200	2332
81	11. Office	5.45 TSF	10	2	12	3	9	13	71
81	20. Church	28.31 TSF	2	1	3	10	8	18	218
81	25. Junior High School	45.00 STU	8	4	12	5	6	11	46
81	26. High School	149.00 STU	33	10	43	19	16	36	207
81	28. Park	0.20 ACRE	0	0	0	0	0	0	1
81	TOTAL		212	311	522	430	347	777	7784
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82	1. Res - Low	489.00 DU	98	293	391	293	196	489	4890
82	2. Res - Medium	15.00 DU	8	3	11	8	6	15	129
82	3. Res - Med-High	158.00 DU	71	24	95	71	57	128	1122
82	9. General Commercial	41.82 TSF	38	33	71	121	130	251	2927
82	11. Office	4.36 TSF	8	1	10	3	7	10	57
82	28. Park	8.00 ACRE	2	0	2	2	2	3	40
82	TOTAL		225	355	579	498	398	896	9165

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
83	1. Res - Low	327.00 DU	65	196	262	196	131	327	3270
83	5. Mobile Home	5.00 DU	0	1	1	1	1	2	17
83	9. General Commercial	8.49 TSF	8	7	14	25	26	51	594
83	11. Office	11.98 TSF	23	4	26	7	20	28	156
83	TOTAL		96	208	304	229	178	407	4037
84	1. Res - Low	82.00 DU	16	49	66	49	33	82	820
84	TOTAL		16	49	66	49	33	82	820
85	1. Res - Low	121.00 DU	24	73	97	73	48	121	1210
85	11. Office	3.27 TSF	6	1	7	2	6	8	43
85	24. Elementary School	453.00 STU	77	41	118	45	63	109	467
85	25. Junior High School	772.00 STU	131	69	201	77	108	185	795
85	TOTAL		239	184	422	197	225	423	2514
86	1. Res - Low	253.00 DU	51	152	202	152	101	253	2530
86	2. Res - Medium	12.00 DU	6	2	9	6	5	12	103
86	3. Res - Med-High	26.00 DU	12	4	16	12	9	21	185
86	TOTAL		69	158	227	170	116	286	2818
87	1. Res - Low	707.00 DU	141	424	566	424	283	707	7070
87	3. Res - Med-High	18.00 DU	8	3	11	8	6	15	128
87	9. General Commercial	50.97 TSF	46	41	87	148	158	306	3568
87	TOTAL		195	468	663	580	447	1027	10766
88	1. Res - Low	178.00 DU	36	107	142	107	71	178	1780
88	3. Res - Med-High	78.00 DU	35	12	47	35	28	63	554
88	TOTAL		71	119	189	142	99	241	2334
89	1. Res - Low	6.00 DU	1	4	5	4	2	6	60
89	TOTAL		1	4	5	4	2	6	60
90	1. Res - Low	605.00 DU	121	363	484	363	242	605	6050
90	2. Res - Medium	2.00 DU	1	0	1	1	1	2	17
90	11. Office	2.18 TSF	4	1	5	1	4	5	28
90	TOTAL		126	364	490	365	247	612	6096
91	1. Res - Low	708.00 DU	142	425	566	425	283	708	7080
91	24. Elementary School	494.00 STU	84	44	128	49	69	119	509
91	24. Elementary School	581.00 STU	99	52	151	58	81	139	598
91	TOTAL		324	522	846	532	434	966	8187
92	1. Res - Low	1.00 DU	0	1	1	1	0	1	10
92	9. General Commercial	9.80 TSF	9	8	17	28	30	59	686
92	TOTAL		9	8	17	29	31	60	696
94	1. Res - Low	268.00 DU	54	161	214	161	107	268	2680
94	25. Junior High School	732.00 STU	124	66	190	73	102	176	754
94	27. Com. Recreation	1.20 ACRE	0	0	0	0	0	0	48
94	TOTAL		178	227	405	234	210	444	3482
95	1. Res - Low	476.00 DU	95	286	381	286	190	476	4760
95	TOTAL		95	286	381	286	190	476	4760

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
99	1. Res - Low	127.00 DU	25	76	102	76	51	127	1270
99	9. General Commercial	14.37 TSF	13	11	24	42	45	86	1006
99	11. Office	43.56 TSF	83	13	96	26	74	100	566
99	13. Industrial	1314.42 TSF	1104	158	1262	158	1196	1354	9162
99	24. Elementary School	435.00 STU	74	39	113	44	61	104	448
99	TOTAL		1299	298	1597	345	1426	1772	12452
100	1. Res - Low	82.00 DU	16	49	66	49	33	82	820
100	2. Res - Medium	26.00 DU	14	5	19	14	11	25	224
100	9. General Commercial	18.95 TSF	17	15	32	55	59	114	1327
100	11. Office	346.30 TSF	658	104	762	208	589	796	4502
100	13. Industrial	2344.62 TSF	1969	281	2251	281	2134	2415	16342
100	TOTAL		2675	454	3129	607	2825	3432	23214
101	1. Res - Low	10.00 DU	2	6	8	6	4	10	100
101	9. General Commercial	3.92 TSF	4	3	7	11	12	24	274
101	11. Office	8.71 TSF	17	3	19	5	15	20	113
101	13. Industrial	306.01 TSF	257	37	294	37	278	315	2133
101	24. Elementary School	371.00 STU	63	33	96	37	52	89	382
101	TOTAL		342	82	424	96	361	458	3003
102	9. General Commercial	71.59 TSF	64	57	122	208	222	430	5011
102	11. Office	295.84 TSF	562	89	651	178	503	680	3846
102	13. Industrial	2612.65 TSF	2195	314	2508	314	2378	2691	18210
102	TOTAL		2821	460	3281	699	3102	3801	27067
103	1. Res - Low	1.00 DU	0	1	1	1	0	1	10
103	9. General Commercial	65.34 TSF	59	52	111	189	203	392	4574
103	11. Office	139.39 TSF	265	42	307	84	237	321	1812
103	13. Industrial	1050.89 TSF	883	126	1009	126	956	1082	7325
103	TOTAL		1207	221	1427	400	1396	1796	13721
104	9. General Commercial	26.40 TSF	24	21	45	77	82	158	1848
104	13. Industrial	1019.20 TSF	856	122	978	122	927	1050	7104
104	TOTAL		880	143	1023	199	1009	1208	8952
105	9. General Commercial	74.94 TSF	67	60	127	217	232	450	5246
105	11. Office	31.58 TSF	60	9	69	19	54	73	411
105	13. Industrial	2600.72 TSF	2185	312	2497	312	2367	2679	18127
105	TOTAL		2312	382	2694	548	2653	3201	23783
106	2. Res - Medium	1.00 DU	1	0	1	1	0	1	9
106	3. Res - Med-High	96.00 DU	43	14	58	43	35	78	682
106	5. Mobile Home	105.00 DU	5	23	28	24	14	38	356
106	9. General Commercial	73.83 TSF	66	59	126	214	229	443	5168
106	11. Office	72.96 TSF	139	22	161	44	124	168	948
106	13. Industrial	203.64 TSF	171	24	195	24	185	210	1419
106	16. Hotel	4.00 ROOM	2	1	3	2	2	3	48
106	TOTAL		427	144	571	352	588	940	8630
107	9. General Commercial	60.90 TSF	55	49	104	177	189	365	4263
107	13. Industrial	1385.10 TSF	1163	166	1330	166	1260	1427	9654
107	TOTAL		1218	215	1433	343	1449	1792	13917

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
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108	1. Res - Low	32.00 DU	6	19	26	19	13	32	320
108	2. Res - Medium	39.00 DU	21	7	28	21	17	38	335
108	3. Res - Med-High	157.00 DU	71	24	94	71	57	127	1115
108	11. Office	13.07 TSF	25	4	29	8	22	30	170
108	13. Industrial	273.34 TSF	230	33	262	33	249	282	1905
108	TOTAL		353	86	439	152	357	509	3845
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109	6. Single-Family Res.	16.00 DU	3	10	13	10	6	16	160
109	7. Multi-Family Res.	52.00 DU	10	26	36	21	16	36	416
109	17. Retail Employment	188.00 EMP	113	26	139	96	139	235	2472
109	18. Total Employment	2467.00 EMP	567	74	641	173	444	617	5921
109	TOTAL		694	136	830	299	605	904	8969
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110	1. Res - Low	75.00 DU	15	45	60	45	30	75	750
110	2. Res - Medium	65.00 DU	35	12	47	35	28	63	559
110	5. Mobile Home	203.00 DU	10	45	55	47	26	73	688
110	9. General Commercial	197.00 TSF	177	158	335	571	611	1182	13790
110	11. Office	1190.00 TSF	2261	357	2618	714	2023	2737	15470
110	13. Industrial	520.00 TSF	437	62	499	62	473	536	3624
110	16. Hotel	188.00 ROOM	94	56	150	75	75	150	2256
110	27. Com. Recreation	6.00 ACRE	0	0	0	0	0	0	240
110	TOTAL		3029	735	3764	1550	3266	4816	37378
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111	9. General Commercial	73.30 TSF	66	59	125	213	227	440	5131
111	11. Office	166.30 TSF	316	50	366	100	283	382	2162
111	13. Industrial	1719.20 TSF	1444	206	1650	206	1564	1771	11983
111	TOTAL		1826	315	2141	519	2074	2593	19276
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112	1. Res - Low	500.00 DU	100	300	400	300	200	500	5000
112	2. Res - Medium	36.00 DU	19	6	26	19	15	35	310
112	4. Res - High/Apt.	215.00 DU	22	86	108	86	43	129	1355
112	9. General Commercial	145.00 TSF	131	116	247	421	450	870	10150
112	11. Office	233.00 TSF	443	70	513	140	396	536	3029
112	22. Fire Station	2.00 ACRE	0	0	0	0	0	0	40
112	24. Elementary School	1315.00 STU	224	118	342	132	184	316	1354
112	28. Park	23.00 ACRE	5	0	5	5	5	9	115
112	TOTAL		942	697	1639	1102	1293	2395	21353
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113	1. Res - Low	360.00 DU	72	216	288	216	144	360	3600
113	2. Res - Medium	12.00 DU	6	2	9	6	5	12	103
113	4. Res - High/Apt.	8.00 DU	1	3	4	3	2	5	50
113	9. General Commercial	8.00 TSF	7	6	14	23	25	48	560
113	TOTAL		86	228	314	249	176	424	4314
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114	1. Res - Low	67.00 DU	13	40	54	40	27	67	670
114	4. Res - High/Apt.	12.00 DU	1	5	6	5	2	7	76
114	9. General Commercial	28.80 TSF	26	23	49	84	89	173	2016
114	11. Office	27.60 TSF	52	8	61	17	47	63	359
114	16. Hotel	130.00 ROOM	65	39	104	52	52	104	1560
114	23. Cemetary	20.00 ACRE	0	0	0	0	0	0	83
114	TOTAL		158	115	273	197	217	414	4764

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
115	4. Res - High/Apt.	440.00 DU	44	176	220	176	88	264	2772
115	9. General Commercial	20.00 TSF	18	16	34	58	62	120	1400
115	10. Regional Commercial	620.00 TSF	248	124	372	868	930	1798	21700
115	11. Office	1225.00 TSF	2328	368	2695	735	2083	2818	15925
115	16. Hotel	460.00 ROOM	230	138	368	184	184	368	5520
115	TOTAL		2868	822	3689	2021	3347	5368	47317
116	9. General Commercial	51.84 TSF	47	41	88	150	161	311	3629
116	11. Office	130.68 TSF	248	39	287	78	222	301	1699
116	12. Medical Office	63.24 TSF	58	46	103	62	158	230	2161
116	19. Hospital	496.00 BED	382	149	531	228	377	605	5828
116	29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500
116	TOTAL		1098	379	1477	584	1473	2057	19817
117	2. Res - Medium	208.00 DU	112	37	150	112	89	202	1789
117	4. Res - High/Apt.	620.00 DU	62	248	310	248	124	372	3906
117	9. General Commercial	10.00 TSF	9	8	17	29	31	60	700
117	11. Office	150.00 TSF	285	45	330	90	255	345	1950
117	TOTAL		468	338	807	479	499	979	8345
118	1. Res - Low	471.00 DU	94	283	377	283	188	471	4710
118	2. Res - Medium	60.00 DU	32	11	43	32	26	58	516
118	4. Res - High/Apt.	997.00 DU	100	399	499	399	199	598	6281
118	9. General Commercial	200.00 TSF	180	160	340	580	620	1200	14000
118	11. Office	810.70 TSF	1540	243	1784	486	1378	1865	10539
118	12. Medical Office	3.00 TSF	3	2	5	3	8	11	103
118	13. Industrial	132.00 TSF	111	16	127	16	120	136	920
118	19. Hospital	182.00 BED	140	55	195	84	138	222	2139
118	TOTAL		2200	1168	3368	1883	2678	4561	39207
119	1. Res - Low	121.00 DU	24	73	97	73	48	121	1210
119	2. Res - Medium	37.00 DU	20	7	27	20	16	36	318
119	4. Res - High/Apt.	17.00 DU	2	7	9	7	3	10	107
119	9. General Commercial	45.00 TSF	41	36	77	131	140	270	3150
119	11. Office	405.00 TSF	770	122	891	243	689	932	5265
119	12. Medical Office	405.00 TSF	369	292	660	397	1073	1470	13839
119	16. Hotel	32.00 ROOM	16	10	26	13	13	26	384
119	19. Hospital	690.00 BED	531	207	738	317	524	842	8108
119	24. Elementary School	519.00 STU	88	47	135	52	73	125	535
119	TOTAL		1860	798	2658	1252	2579	3831	32915
120	1. Res - Low	157.00 DU	31	94	126	94	63	157	1570
120	2. Res - Medium	127.00 DU	69	23	91	69	55	123	1092
120	4. Res - High/Apt.	375.00 DU	38	150	188	150	75	225	2363
120	34. Specialty Comm.	6.00 TSF	2	1	4	8	9	17	210
120	11. Office	15.00 TSF	29	5	33	9	26	35	195
120	12. Medical Office	80.00 TSF	73	58	130	78	212	290	2734
120	13. Industrial	60.00 TSF	50	7	58	7	55	62	418
120	19. Hospital	110.00 BED	85	33	118	51	84	134	1293
120	TOTAL		376	371	747	466	577	1043	9874
121	6. Single-Family Res.	171.00 DU	34	103	137	103	68	171	1710

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
121	7. Multi-Family Res.	349.00 DU	70	175	244	140	105	244	2792
121	17. Retail Employment	444.00 EMP	266	62	329	226	329	555	5839
121	18. Total Employment	2570.00 EMP	591	77	668	180	463	643	6168
121	TOTAL		962	416	1378	649	964	1613	16509
122	1. Res - Low	23.00 DU	5	14	18	14	9	23	230
122	2. Res - Medium	165.00 DU	89	30	119	89	71	160	1419
122	9. General Commercial	80.00 TSF	72	64	136	232	248	480	5600
122	11. Office	760.00 TSF	1444	228	1672	456	1292	1748	9880
122	19. Hospital	122.00 BED	94	37	131	56	93	149	1434
122	28. Park	23.00 ACRE	5	0	5	5	5	9	115
122	TOTAL		1708	372	2080	852	1717	2569	18678
123	1. Res - Low	500.00 DU	100	300	400	300	200	500	5000
123	2. Res - Medium	20.00 DU	11	4	14	11	9	19	172
123	3. Res - Med-High	18.00 DU	8	3	11	8	6	15	128
123	5. Mobile Home	17.00 DU	1	4	5	4	2	6	58
123	9. General Commercial	116.96 TSF	105	94	199	339	363	702	8187
123	11. Office	6.53 TSF	12	2	14	4	11	15	85
123	16. Hotel	6.00 ROOM	3	2	5	2	2	5	72
123	TOTAL		240	407	648	668	593	1262	13702
124	1. Res - Low	431.00 DU	86	259	345	259	172	431	4310
124	2. Res - Medium	4.00 DU	2	1	3	2	2	4	34
124	3. Res - Med-High	17.00 DU	8	3	10	8	6	14	121
124	11. Office	13.07 TSF	25	4	29	8	22	30	170
124	20. Church	35.94 TSF	3	1	4	12	11	23	277
124	TOTAL		124	267	391	288	213	502	4912
125	1. Res - Low	268.00 DU	54	161	214	161	107	268	2680
125	2. Res - Medium	95.00 DU	51	17	68	51	41	92	817
125	3. Res - Med-High	48.00 DU	22	7	29	22	17	39	341
125	9. General Commercial	167.92 TSF	151	134	285	487	521	1008	11754
125	11. Office	70.79 TSF	135	21	156	42	120	163	920
125	16. Hotel	12.00 ROOM	6	4	10	5	5	10	144
125	TOTAL		418	344	762	768	811	1579	16656
126	1. Res - Low	530.00 DU	106	318	424	318	212	530	5300
126	9. General Commercial	104.54 TSF	94	84	178	303	324	627	7318
126	11. Office	55.54 TSF	106	17	122	33	94	128	722
126	20. Church	16.34 TSF	1	0	2	6	5	10	126
126	TOTAL		307	419	726	660	635	1295	13466
127	1. Res - Low	116.00 DU	23	70	93	70	46	116	1160
127	2. Res - Medium	4.00 DU	2	1	3	2	2	4	34
127	3. Res - Med-High	80.00 DU	36	12	48	36	29	65	568
127	9. General Commercial	14.37 TSF	13	11	24	42	45	86	1006
127	13. Industrial	19.60 TSF	16	2	19	2	18	20	137
127	20. Church	94.74 TSF	8	3	10	32	28	61	729
127	TOTAL		98	99	197	184	168	352	3634
128	1. Res - Low	239.00 DU	48	143	191	143	96	239	2390

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
128	2. Res - Medium	10.00 DU	5	2	7	5	4	10	86
128	9. General Commercial	43.12 TSF	39	34	73	125	134	259	3018
128	20. Church	22.87 TSF	2	1	3	8	7	15	176
128	TOTAL		94	180	274	282	240	522	5670
129	1. Res - Low	103.00 DU	21	62	82	62	41	103	1030
129	3. Res - Med-High	206.00 DU	93	31	124	93	74	167	1463
129	9. General Commercial	40.51 TSF	36	32	69	117	126	243	2836
129	11. Office	14.16 TSF	27	4	31	8	24	33	184
129	13. Industrial	7.62 TSF	6	1	7	1	7	8	53
129	TOTAL		183	130	313	281	272	553	5565
130	1. Res - Low	102.00 DU	20	61	82	61	41	102	1020
130	3. Res - Med-High	10.00 DU	5	2	6	5	4	8	71
130	5. Mobile Home	71.00 DU	4	16	19	16	9	26	241
130	9. General Commercial	152.24 TSF	137	122	259	441	472	913	10657
130	11. Office	15.25 TSF	29	5	34	9	26	35	198
130	TOTAL		194	205	399	533	551	1084	12187
131	1. Res - Low	152.00 DU	30	91	122	91	61	152	1520
131	2. Res - Medium	134.00 DU	72	24	96	72	58	130	1152
131	3. Res - Med-High	304.00 DU	137	46	182	137	109	246	2158
131	34. Specialty Comm.	88.86 TSF	36	18	53	124	133	258	3110
131	11. Office	75.14 TSF	143	23	165	45	128	173	977
131	13. Industrial	434.51 TSF	365	52	417	52	395	448	3029
131	TOTAL		783	253	1036	522	884	1406	11946
132	1. Res - Low	412.00 DU	82	247	330	247	165	412	4120
132	2. Res - Medium	17.00 DU	9	3	12	9	7	16	146
132	13. Industrial	54.89 TSF	46	7	53	7	50	57	383
132	11. Office	172.06 TSF	327	52	379	103	293	396	2237
132	20. Church	29.40 TSF	2	1	3	10	9	19	226
132	TOTAL		467	309	776	376	523	900	7112
133	1. Res - Low	89.00 DU	18	53	71	53	36	89	890
133	2. Res - Medium	81.00 DU	44	15	58	44	35	79	697
133	3. Res - Med-High	529.00 DU	238	79	317	238	190	428	3756
133	34. Specialty Comm.	75.14 TSF	30	15	45	105	113	218	2630
133	11. Office	42.48 TSF	81	13	93	25	72	98	552
133	13. Industrial	54.45 TSF	46	7	52	7	50	56	380
133	20. Church	102.37 TSF	8	3	11	35	31	66	788
133	TOTAL		464	185	649	507	526	1033	9692
134	1. Res - Low	57.00 DU	11	34	46	34	23	57	570
134	2. Res - Medium	122.00 DU	66	22	88	66	52	118	1049
134	3. Res - Med-High	12.00 DU	5	2	7	5	4	10	85
134	9. General Commercial	1.96 TSF	2	2	3	6	6	12	137
134	11. Office	29.40 TSF	56	9	65	18	50	68	382
134	20. Church	58.81 TSF	5	2	6	20	18	38	453
134	28. Park	3.20 ACRE	1	0	1	1	1	1	16
134	TOTAL		146	70	216	149	154	303	2693

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
135	1. Res - Low	342.00 DU	68	205	274	205	137	342	3420
135	2. Res - Medium	329.00 DU	178	59	237	178	141	319	2829
135	3. Res - Med-High	36.00 DU	16	5	22	16	13	29	256
135	34. Specialty Comm.	46.39 TSF	19	9	28	65	70	135	1624
135	11. Office	143.74 TSF	273	43	316	86	244	331	1969
135	20. Church	93.65 TSF	7	3	10	32	28	60	721
135	TOTAL		561	325	886	582	633	1215	10713
136	6. Single-Family Res.	493.00 DU	99	296	394	296	197	493	4930
136	7. Multi-Family Res.	717.00 DU	143	359	502	287	215	502	5736
136	17. Retail Employment	184.00 EMP	110	26	136	94	136	230	2420
136	18. Total Employment	2180.00 EMP	501	65	567	153	392	545	5232
136	TOTAL		854	745	1599	829	941	1770	18318
137	1. Res - Low	474.00 DU	95	284	379	284	190	474	4740
137	3. Res - Med-High	4.00 DU	2	1	2	2	1	3	28
137	9. General Commercial	79.71 TSF	72	64	136	231	247	478	5580
137	11. Office	93.65 TSF	178	28	206	56	159	215	1217
137	16. Hotel	8.00 ROOM	4	2	6	3	3	6	96
137	20. Church	125.24 TSF	10	4	14	43	38	80	964
137	TOTAL		360	383	743	619	638	1257	12626
138	1. Res - Low	127.00 DU	25	76	102	76	51	127	1270
138	2. Res - Medium	30.00 DU	16	5	22	16	13	29	258
138	3. Res - Med-High	138.00 DU	62	21	83	62	50	112	980
138	9. General Commercial	195.37 TSF	176	156	332	567	606	1172	13676
138	11. Office	13.07 TSF	25	4	29	8	22	30	170
138	TOTAL		304	263	567	729	741	1470	16354
139	1. Res - Low	173.00 DU	35	104	138	104	69	173	1730
139	2. Res - Medium	38.00 DU	21	7	27	21	16	37	327
139	3. Res - Med-High	116.00 DU	52	17	70	52	42	94	824
139	9. General Commercial	122.84 TSF	111	98	209	356	381	737	8599
139	11. Office	7.62 TSF	14	2	17	5	13	18	99
139	TOTAL		232	229	461	537	521	1058	11578
140	1. Res - Low	571.00 DU	114	343	457	343	228	571	5710
140	2. Res - Medium	73.00 DU	39	13	53	39	31	71	628
140	3. Res - Med-High	16.00 DU	7	2	10	7	6	13	114
140	5. Mobile Home	29.00 DU	1	6	8	7	4	10	98
140	9. General Commercial	90.17 TSF	81	72	153	261	280	541	6312
140	11. Office	186.22 TSF	354	56	410	112	317	428	2421
140	16. Hotel	4.00 ROOM	2	1	3	2	2	3	48
140	20. Church	18.51 TSF	1	1	2	6	6	12	143
140	27. Com. Recreation	19.40 ACRE	0	0	0	0	0	0	776
140	TOTAL		601	494	1095	777	873	1650	16249
141	1. Res - Low	85.00 DU	17	51	68	51	34	85	850
141	2. Res - Medium	112.00 DU	60	20	81	60	48	109	963
141	9. General Commercial	51.62 TSF	46	41	88	150	160	310	3613
141	TOTAL		124	112	236	261	242	503	5427

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
142	1. Res - Low	12.00 DU	2	7	10	7	5	12	120
142	2. Res - Medium	67.00 DU	36	12	48	36	29	65	576
142	3. Res - Med-High	269.00 DU	121	40	161	121	97	218	1910
142	5. Mobile Home	50.00 DU	3	11	14	12	7	18	170
142	9. General Commercial	109.77 TSF	99	88	187	318	340	659	7634
142	11. Office	67.52 TSF	128	20	149	41	115	155	873
142	16. Hotel	20.00 ROOM	10	6	16	8	8	16	240
142	20. Church	9.80 TSF	1	0	1	3	3	6	75
142	27. Com. Recreation	0.40 ACRE	0	0	0	0	0	0	16
142	TOTAL		400	185	585	546	603	1149	11669
143	6. Single-Family Res.	511.00 DU	102	307	409	307	204	511	5110
143	7. Multi-Family Res.	448.00 DU	90	224	314	179	134	314	3584
143	17. Retail Employment	472.00 EMP	283	66	349	241	349	590	6207
143	18. Total Employment	1898.00 EMP	437	57	493	133	342	475	4555
143	TOTAL		912	654	1565	859	1030	1889	19456
144	6. Single-Family Res.	511.00 DU	102	307	409	307	204	511	5110
144	7. Multi-Family Res.	448.00 DU	90	224	314	179	134	314	3584
144	17. Retail Employment	472.00 EMP	283	66	349	241	349	590	6207
144	18. Total Employment	1898.00 EMP	437	57	493	133	342	475	4555
144	TOTAL		912	654	1565	859	1030	1889	19456
145	6. Single-Family Res.	437.00 DU	87	262	350	262	175	437	4370
145	7. Multi-Family Res.	383.00 DU	77	192	268	153	115	268	3064
145	17. Retail Employment	404.00 EMP	242	57	299	206	299	505	5313
145	18. Total Employment	1623.00 EMP	373	49	422	114	292	406	3895
145	TOTAL		780	559	1339	735	881	1616	16642
146	6. Single-Family Res.	687.00 DU	137	412	550	412	275	687	6870
146	7. Multi-Family Res.	602.00 DU	120	301	421	241	181	421	4816
146	17. Retail Employment	634.00 EMP	380	89	469	323	469	793	8337
146	18. Total Employment	2551.00 EMP	587	77	663	179	459	638	6122
146	TOTAL		1225	878	2103	1155	1384	2539	26146
147	6. Single-Family Res.	125.00 DU	25	75	100	75	50	125	1250
147	7. Multi-Family Res.	110.00 DU	22	55	77	44	33	77	880
147	17. Retail Employment	115.00 EMP	69	16	85	59	85	144	1512
147	18. Total Employment	464.00 EMP	107	14	121	32	84	116	1114
147	TOTAL		223	160	383	210	252	462	4756
148	6. Single-Family Res.	1033.00 DU	207	620	826	620	413	1033	10330
148	7. Multi-Family Res.	1694.00 DU	339	847	1186	678	508	1186	13552
148	17. Retail Employment	1142.00 EMP	685	160	845	582	845	1428	15017
148	18. Total Employment	10359.00 EMP	2383	311	2693	725	1865	2590	24862
148	TOTAL		3613	1937	5551	2605	3631	6236	63761
149	6. Single-Family Res.	466.00 DU	93	280	373	280	186	466	4660
149	7. Multi-Family Res.	346.00 DU	69	173	242	138	104	242	2768
149	17. Retail Employment	240.00 EMP	144	34	178	122	178	300	3156
149	18. Total Employment	721.00 EMP	166	22	187	50	130	180	1730
149	TOTAL		472	508	980	591	598	1188	12314

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
150	6. Single-Family Res.	700.00 DU	140	420	560	420	280	700	7000
150	7. Multi-Family Res.	518.00 DU	104	259	363	207	155	363	4144
150	17. Retail Employment	360.00 EMP	216	50	266	184	266	450	4734
150	18. Total Employment	1082.00 EMP	249	32	281	76	195	271	2597
150	TOTAL		708	762	1470	887	897	1783	18475
151	6. Single-Family Res.	372.00 DU	74	223	298	223	149	372	3720
151	7. Multi-Family Res.	15.00 DU	3	8	11	6	5	11	120
151	18. Total Employment	184.00 EMP	42	6	48	13	33	46	442
151	TOTAL		120	236	356	242	186	429	4282
152	6. Single-Family Res.	557.00 DU	111	334	446	334	223	557	5570
152	7. Multi-Family Res.	23.00 DU	5	12	16	9	7	16	184
152	18. Total Employment	275.00 EMP	63	8	72	19	50	69	660
152	TOTAL		179	354	533	363	279	642	6414
153	6. Single-Family Res.	372.00 DU	74	223	298	223	149	372	3720
153	7. Multi-Family Res.	15.00 DU	3	8	11	6	5	11	120
153	18. Total Employment	184.00 EMP	42	6	48	13	33	46	442
153	TOTAL		120	236	356	242	186	429	4282
154	6. Single-Family Res.	557.00 DU	111	334	446	334	223	557	5570
154	7. Multi-Family Res.	23.00 DU	5	12	16	9	7	16	184
154	18. Total Employment	275.00 EMP	63	8	72	19	50	69	660
154	TOTAL		179	354	533	363	279	642	6414
155	6. Single-Family Res.	465.00 DU	93	279	372	279	186	465	4650
155	7. Multi-Family Res.	19.00 DU	4	10	13	8	6	13	152
155	18. Total Employment	229.00 EMP	53	7	60	16	41	57	550
155	TOTAL		149	295	445	303	233	536	5352
156	6. Single-Family Res.	416.00 DU	83	250	333	250	166	416	4160
156	7. Multi-Family Res.	325.00 DU	65	163	228	130	98	228	2600
156	17. Retail Employment	259.00 EMP	155	36	192	132	192	324	3406
156	18. Total Employment	2023.00 EMP	465	61	526	142	364	506	4855
156	TOTAL		769	509	1278	653	820	1473	15021
157	6. Single-Family Res.	416.00 DU	83	250	333	250	166	416	4160
157	7. Multi-Family Res.	325.00 DU	65	163	228	130	98	228	2600
157	17. Retail Employment	259.00 EMP	155	36	192	132	192	324	3406
157	18. Total Employment	2023.00 EMP	465	61	526	142	364	506	4855
157	TOTAL		769	509	1278	653	820	1473	15021
158	6. Single-Family Res.	1194.00 DU	239	716	955	716	478	1194	11940
158	7. Multi-Family Res.	347.00 DU	69	174	243	139	104	243	2776
158	17. Retail Employment	221.00 EMP	133	31	164	113	164	276	2906
158	18. Total Employment	1416.00 EMP	326	42	368	99	255	354	3398
158	TOTAL		766	963	1730	1067	1000	2067	21021
159	6. Single-Family Res.	486.00 DU	97	292	389	292	194	486	4860
159	7. Multi-Family Res.	827.00 DU	165	414	579	331	248	579	6616
159	17. Retail Employment	1510.00 EMP	906	211	1117	770	1117	1888	19857

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
159	18. Total Employment	5445.00 EMP	1252	163	1416	381	980	1361	13068
159	TOTAL		2421	1080	3501	1774	2540	4314	44401
160	6. Single-Family Res.	2452.00 DU	490	1471	1962	1471	981	2452	24520
160	7. Multi-Family Res.	658.00 DU	132	329	461	263	197	461	5264
160	17. Retail Employment	961.00 EMP	577	135	711	490	711	1201	12637
160	18. Total Employment	1994.00 EMP	459	60	518	140	359	499	4786
160	TOTAL		1657	1995	3652	2364	2248	4612	47207
161	1. Res - Low	28.00 DU	6	17	22	17	11	28	280
161	TOTAL		6	17	22	17	11	28	280
173	6. Single-Family Res.	874.00 DU	175	524	699	524	350	874	8740
173	18. Total Employment	31.00 EMP	7	1	8	2	6	8	74
173	TOTAL		182	525	707	527	355	882	8814
174	6. Single-Family Res.	407.00 DU	81	244	326	244	163	407	4070
174	7. Multi-Family Res.	622.00 DU	124	311	435	249	187	435	4976
174	TOTAL		206	555	761	493	349	842	9046
178	6. Single-Family Res.	260.00 DU	52	156	208	156	104	260	2600
178	7. Multi-Family Res.	586.00 DU	117	293	410	234	176	410	4688
178	17. Retail Employment	247.00 EMP	148	35	183	126	183	309	3248
178	18. Total Employment	247.00 EMP	57	7	64	17	44	62	593
178	TOTAL		374	491	865	534	507	1041	11129
179	7. Multi-Family Res.	129.00 DU	26	65	90	52	39	90	1032
179	TOTAL		26	65	90	52	39	90	1032
181	6. Single-Family Res.	953.00 DU	191	572	762	572	381	953	9530
181	18. Total Employment	70.00 EMP	16	2	18	5	13	18	168
181	TOTAL		207	574	781	577	394	971	9698
182	6. Single-Family Res.	1037.00 DU	207	622	830	622	415	1037	10370
182	7. Multi-Family Res.	74.00 DU	15	37	52	30	22	52	592
182	17. Retail Employment	533.00 EMP	320	75	394	272	394	666	7009
182	18. Total Employment	624.00 EMP	144	19	162	44	112	156	1498
182	TOTAL		686	753	1438	967	944	1911	19469
183	18. Total Employment	117.00 EMP	27	4	30	8	21	29	281
183	TOTAL		27	4	30	8	21	29	281
184	6. Single-Family Res.	66.00 DU	13	40	53	40	26	66	660
184	7. Multi-Family Res.	276.00 DU	55	138	193	110	83	193	2208
184	17. Retail Employment	5.00 EMP	3	1	4	3	4	6	66
184	18. Total Employment	60.00 EMP	14	2	16	4	11	15	144
184	TOTAL		85	180	265	157	124	280	3078
185	6. Single-Family Res.	375.00 DU	75	225	300	225	150	375	3750
185	7. Multi-Family Res.	1565.00 DU	313	783	1096	626	470	1096	12520
185	17. Retail Employment	26.00 EMP	16	4	19	13	19	33	342
185	18. Total Employment	340.00 EMP	78	10	88	24	61	85	816
185	TOTAL		482	1021	1503	888	700	1588	17428

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
186	6. Single-Family Res.	899.00 DU	180	539	719	539	360	899	8990
186	7. Multi-Family Res.	1136.00 DU	227	568	795	454	341	795	9088
186	17. Retail Employment	488.00 EMP	293	68	361	249	361	610	6417
186	18. Total Employment	1766.00 EMP	406	53	459	124	318	442	4238
186	TOTAL		1106	1229	2335	1366	1379	2746	28734
187	6. Single-Family Res.	1089.00 DU	218	653	871	653	436	1089	10890
187	7. Multi-Family Res.	455.00 DU	91	228	319	182	137	319	3640
187	17. Retail Employment	224.00 EMP	134	31	166	114	166	280	2946
187	18. Total Employment	973.00 EMP	224	29	253	68	175	243	2335
187	TOTAL		667	941	1608	1018	913	1931	19811
188	6. Single-Family Res.	105.00 DU	21	63	84	63	42	105	1050
188	7. Multi-Family Res.	247.00 DU	49	124	173	99	74	173	1976
188	17. Retail Employment	407.00 EMP	244	57	301	208	301	509	5352
188	18. Total Employment	4202.00 EMP	966	126	1093	294	756	1051	10085
188	TOTAL		1281	370	1651	664	1174	1837	18463

ORANGE CIRCULATION STUDY TRAFFIC MODEL - 1987 LAND USE AND TRIP GENERATION SUMMARY

USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
		IN	OUT	TOTAL	IN	OUT	TOTAL	
1. Res - Low	27740.00 DU	5548	16644	22192	16644	11096	27740	277400
2. Res - Medium	2511.00 DU	1356	452	1808	1356	1080	2436	21595
3. Res - Med-High	5314.00 DU	2391	797	3188	2391	1913	4304	37729
4. Res - High/Apt.	2684.00 DU	268	1074	1342	1074	537	1610	16909
5. Mobile Home	712.00 DU	36	157	192	164	93	256	2414
6. Single-Family Res.	24476.00 DU	4895	14686	19581	14686	9790	24476	244760
7. Multi-Family Res.	15289.00 DU	3058	7645	10702	6116	4587	10702	122312
8. Hillside Res. (EO)	0.00 DU	0	0	0	0	0	0	0
9. General Commercial	4922.32 TSF	4430	3938	8368	14275	15259	29534	344562
10. Regional Commerical	620.00 TSF	248	124	372	868	930	1798	21700
11. Office	7903.01 TSF	15016	2371	17387	4742	13435	18177	102739
12. Medical Office	551.24 TSF	502	397	899	540	1461	2001	18836
13. Industrial	16351.38 TSF	13735	1962	15697	1962	14880	16842	113969
14. Industrial Park	0.00 TSF	0	0	0	0	0	0	0
15. R&D	0.00 TSF	0	0	0	0	0	0	0
16. Hotel	904.00 ROOM	452	271	723	362	362	723	10848
17. Retail Employment	10745.00 EMP	6447	1504	7951	5480	7951	13431	141297
18. Total Employment	55682.00 EMP	12807	1670	14477	3898	10023	13921	133637
19. Hospital	1699.00 BED	1308	510	1818	782	1291	2073	19963
20. Church	1001.90 TSF	80	30	110	341	301	641	7715
21. Library	0.00 TSF	0	0	0	0	0	0	0
22. Fire Station	2.00 ACRE	0	0	0	0	0	0	40
23. Cemetary	20.00 ACRE	0	0	0	0	0	0	83
24. Elementary School	9116.00 STU	1550	820	2370	912	1276	2188	9389
25. Junior High School	2851.00 STU	485	257	741	285	399	684	2937
26. High School	2978.00 STU	655	208	864	387	328	715	4139
27. Com. Recreation	70.53 ACRE	0	0	0	0	0	0	2821
28. Park	128.30 ACRE	26	0	26	26	26	51	642
29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500
30. Golf Course	0.00 ACRE	0	0	0	0	0	0	0
31. Maintenance Yard	0.00 ACRE	0	0	0	0	0	0	0
32. Collge	0.00 STU	0	0	0	0	0	0	0
33. Government Office	0.00 TSF	0	0	0	0	0	0	0
34. Specialty Comm.	216.39 TSF	87	43	130	303	325	628	7574
GRAND TOTAL		75743	55664	131407	77656	97887	175542	1672510

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
1	6. Single-Family Res.	1501.00 DU	300	901	1201	901	600	1501	15010
1	7. Multi-Family Res.	175.00 DU	35	88	123	70	53	123	1400
1	17. Retail Employment	250.00 EMP	150	35	135	128	185	313	3613
1	18. Total Employment	1674.00 EMP	385	50	435	117	301	419	4352
1	TOTAL		870	1073	1944	1215	1139	2355	24375
2	1. Res - Low	176.00 DU	35	106	141	106	70	176	1760
2	9. General Commercial	30.06 TSF	27	24	51	87	93	180	2104
2	24. Elementary School	597.00 STU	101	54	155	60	84	143	615
2	TOTAL		164	183	347	252	247	500	4479
3	6. Single-Family Res.	1345.00 DU	269	807	1076	807	538	1345	13450
3	7. Multi-Family Res.	913.00 DU	183	457	639	365	274	639	7504
3	17. Retail Employment	180.00 EMP	108	25	133	92	133	225	2601
3	18. Total Employment	766.00 EMP	176	23	199	54	138	192	1992
3	TOTAL		736	1312	2047	1318	1083	2401	25347
4	6. Single-Family Res.	2603.00 DU	521	1562	2082	1562	1041	2603	26030
4	7. Multi-Family Res.	1728.00 DU	346	864	1210	691	518	1210	13824
4	17. Retail Employment	1850.00 EMP	1110	259	1369	944	1369	2313	26733
4	18. Total Employment	5128.00 EMP	1179	154	1333	359	923	1282	13333
4	TOTAL		3156	2839	5994	3555	3852	7407	79919
5	6. Single-Family Res.	1562.00 DU	312	937	1250	937	625	1562	15620
5	7. Multi-Family Res.	1037.00 DU	207	519	726	415	311	726	8296
5	17. Retail Employment	1110.00 EMP	666	155	821	566	821	1388	16040
5	18. Total Employment	3077.00 EMP	708	92	800	215	554	769	8000
5	TOTAL		1894	1703	3597	2133	2311	4445	47956
6	1. Res - Low	194.00 DU	39	116	155	116	78	194	1940
6	2. Res - Medium	909.00 DU	491	164	654	491	391	882	7817
6	3. Res - Med-High	1781.00 DU	801	267	1069	801	641	1443	12645
6	6. Single-Family Res.	1041.00 DU	208	625	833	625	416	1041	10410
6	7. Multi-Family Res.	691.00 DU	138	346	484	276	207	484	5528
6	9. General Commercial	265.72 TSF	239	213	452	771	824	1594	18600
6	17. Retail Employment	740.00 EMP	444	104	548	377	548	925	10693
6	18. Total Employment	2051.00 EMP	472	62	533	144	369	513	5333
6	TOTAL		2832	1895	4727	3601	3474	7075	72967
7	6. Single-Family Res.	780.00 DU	156	468	624	468	312	780	7800
7	7. Multi-Family Res.	623.00 DU	125	312	436	249	187	436	4984
7	17. Retail Employment	400.00 EMP	240	56	296	204	296	500	5780
7	18. Total Employment	1140.00 EMP	262	34	296	80	205	285	2964
7	TOTAL		783	870	1653	1001	1000	2001	21528
8	6. Single-Family Res.	203.00 DU	41	122	162	122	81	203	2030
8	7. Multi-Family Res.	255.00 DU	51	128	179	102	77	179	2040
8	17. Retail Employment	68.00 EMP	41	10	50	35	50	85	983
8	18. Total Employment	233.00 EMP	54	7	61	16	42	58	606
8	TOTAL		186	266	452	275	250	525	5658
9	6. Single-Family Res.	68.00 DU	14	41	54	41	27	68	680

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
9	7. Multi-Family Res.	85.00 DU	17	43	60	34	26	60	686
9	17. Retail Employment	23.00 EMP	14	3	17	12	17	29	332
9	18. Total Employment	78.00 EMP	18	2	20	5	14	20	203
9	TOTAL		62	89	151	92	84	176	1895
10	6. Single-Family Res.	834.00 DU	167	500	667	500	334	834	8340
10	7. Multi-Family Res.	708.00 DU	142	354	496	283	212	496	5664
10	17. Retail Employment	564.00 EMP	338	79	417	288	417	705	8150
10	18. Total Employment	3476.00 EMP	799	104	904	243	626	869	9038
10	TOTAL		1446	1038	2484	1315	1589	2904	31191
11	1. Res - Low	845.00 DU	169	507	676	507	338	845	8450
11	2. Res - Medium	781.00 DU	422	141	562	422	336	758	6717
11	3. Res - Med-High	188.00 DU	85	28	113	85	68	152	1335
11	6. Single-Family Res.	834.00 DU	167	500	667	500	334	834	8340
11	7. Multi-Family Res.	708.00 DU	142	354	496	283	212	496	5664
11	9. General Commercial	108.90 TSF	98	87	185	316	338	653	7623
11	17. Retail Employment	564.00 EMP	338	79	417	288	417	705	8150
11	18. Total Employment	3476.00 EMP	799	104	904	243	626	869	9038
11	TOTAL		2220	1801	4020	2644	2668	5312	55316
12	6. Single-Family Res.	1058.00 DU	212	635	846	635	423	1058	10580
12	7. Multi-Family Res.	1160.00 DU	232	580	812	464	348	812	9280
12	17. Retail Employment	400.00 EMP	240	56	296	204	296	500	5780
12	18. Total Employment	1122.00 EMP	258	34	292	79	202	281	2917
12	TOTAL		942	1304	2246	1381	1269	2651	28557
13	6. Single-Family Res.	433.00 DU	87	260	346	260	173	433	4330
13	18. Total Employment	43.00 EMP	10	1	11	3	8	11	112
13	TOTAL		96	261	358	263	181	444	4442
14	6. Single-Family Res.	305.00 DU	61	183	244	183	122	305	3050
14	7. Multi-Family Res.	225.00 DU	45	113	158	90	68	158	1800
14	18. Total Employment	128.00 EMP	29	4	33	9	23	32	333
14	TOTAL		135	299	435	282	213	495	5183
15	6. Single-Family Res.	305.00 DU	61	183	244	183	122	305	3050
15	7. Multi-Family Res.	225.00 DU	45	113	158	90	68	158	1800
15	18. Total Employment	128.00 EMP	29	4	33	9	23	32	333
15	TOTAL		135	299	435	282	213	495	5183
16	2. Res - Medium	592.00 DU	320	107	426	320	255	574	5091
16	3. Res - Med-High	133.00 DU	60	20	80	60	48	108	944
16	6. Single-Family Res.	965.00 DU	193	579	772	579	386	965	9650
16	7. Multi-Family Res.	400.00 DU	80	200	280	160	120	280	3200
16	9. General Commercial	258.09 TSF	232	206	439	748	800	1549	18066
16	18. Total Employment	337.00 EMP	78	10	88	24	61	84	876
16	TOTAL		962	1122	2084	1891	1669	3560	37828
17	6. Single-Family Res.	457.00 DU	91	274	366	274	183	457	4570
17	18. Total Employment	46.00 EMP	11	1	12	3	8	12	120
17	TOTAL		102	276	378	277	191	469	4690

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ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
18	1. Res - Low	112.00 DU	22	67	90	67	45	112	1120
18	2. Res - Medium	166.00 DU	90	30	120	90	71	161	1429
18	3. Res - Med-High	66.00 DU	30	10	40	30	24	53	469
18	28. Park	18.50 ACRE	4	0	4	4	4	7	93
18	TOTAL		145	107	252	190	144	334	3109
19	1. Res - Low	941.00 DU	188	565	753	565	376	941	9410
19	3. Res - Med-High	3.00 DU	1	0	2	1	1	2	21
19	8. Hillside Res. (EO)	104.00 DU	21	83	104	83	42	125	1248
19	28. Park	15.20 ACRE	3	0	3	3	3	6	76
19	TOTAL		213	648	862	652	422	1074	10755
20	1. Res - Low	315.00 DU	63	189	252	189	126	315	3150
20	2. Res - Medium	308.00 DU	166	55	222	166	132	299	2649
20	3. Res - Med-High	557.00 DU	251	84	334	251	201	451	3955
20	8. Hillside Res. (EO)	120.00 DU	24	96	120	96	48	144	1440
20	TOTAL		504	424	928	702	507	1209	11194
21	8. Hillside Res. (EO)	85.00 DU	17	68	85	68	34	102	1020
21	23. Cemetary	6.60 ACRE	0	0	0	0	0	0	27
21	TOTAL		17	68	85	68	34	102	1047
22	1. Res - Low	76.00 DU	15	46	61	46	30	76	760
22	8. Hillside Res. (EO)	8.00 DU	2	6	8	6	3	10	96
22	23. Cemetary	33.50 ACRE	0	0	0	0	0	0	139
22	28. Park	55.40 ACRE	11	0	11	11	11	22	277
22	TOTAL		28	52	80	63	45	108	1272
23	28. Park	137.50 ACRE	28	0	28	28	28	55	688
23	TOTAL		28	0	28	28	28	55	688
24	32. College	7920.00 STU	1188	238	1426	317	634	950	12276
24	TOTAL		1188	238	1426	317	634	950	12276
26	6. Single-Family Res.	82.00 DU	16	49	66	49	33	82	820
26	18. Total Employment	8.00 EMP	2	0	2	1	1	2	21
26	TOTAL		18	49	68	50	34	84	841
28	6. Single-Family Res.	122.00 DU	24	73	98	73	49	122	1220
28	18. Total Employment	13.00 EMP	3	0	3	1	2	3	34
28	TOTAL		27	74	101	74	51	125	1254
29	6. Single-Family Res.	85.00 DU	17	51	68	51	34	85	850
29	18. Total Employment	9.00 EMP	2	0	2	1	2	2	23
29	TOTAL		19	51	70	52	36	87	873
30	6. Single-Family Res.	120.00 DU	24	72	96	72	48	120	1200
30	18. Total Employment	12.00 EMP	3	0	3	1	2	3	31
30	TOTAL		27	72	99	73	50	123	1231
31	6. Single-Family Res.	219.00 DU	44	131	175	131	88	219	2190
31	18. Total Employment	22.00 EMP	5	1	6	2	4	6	57
31	TOTAL		49	132	181	133	92	225	2247

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ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
32	6. Single-Family Res.	171.00 DU	34	103	137	103	68	171	1710
32	18. Total Employment	17.00 EMP	4	1	4	1	3	4	44
32	TOTAL		38	103	141	104	71	175	1754
34	18. Total Employment	400.00 EMP	92	12	104	28	72	100	1040
34	TOTAL		92	12	104	28	72	100	1040
35	6. Single-Family Res.	175.00 DU	35	105	140	105	70	175	1750
35	8. Hillside Res. (EO)	11.00 DU	2	9	11	9	4	13	132
35	18. Total Employment	18.00 EMP	4	1	5	1	3	5	47
35	TOTAL		41	114	156	115	78	193	1929
36	6. Single-Family Res.	100.00 DU	20	60	80	60	40	100	1000
36	18. Total Employment	10.00 EMP	2	0	3	1	2	3	26
36	TOTAL		22	60	83	61	42	103	1026
37	6. Single-Family Res.	382.00 DU	76	229	306	229	153	382	3820
37	8. Hillside Res. (EO)	414.00 DU	83	331	414	331	166	497	4968
37	18. Total Employment	38.00 EMP	9	1	10	3	7	10	99
37	TOTAL		168	562	729	563	325	888	8887
38	6. Single-Family Res.	854.00 DU	171	512	683	512	342	854	8540
38	18. Total Employment	85.00 EMP	20	3	22	6	15	21	221
38	TOTAL		190	515	705	518	357	875	8761
39	6. Single-Family Res.	388.00 DU	78	233	310	233	155	388	3880
39	7. Multi-Family Res.	176.00 DU	35	88	123	70	53	123	1408
39	8. Hillside Res. (EO)	1314.00 DU	263	1051	1314	1051	526	1577	15768
39	9. General Commercial	882.10 TSF	794	706	1500	2558	2735	5293	61747
39	11. Office	777.60 TSF	1477	233	1711	467	1322	1788	10109
39	15. R&D	1270.00 TSF	1143	127	1270	381	1397	1778	13081
39	16. Hotel	250.00 ROOM	125	75	200	100	100	200	3000
39	24. Elementary School	1200.00 STU	204	108	312	120	168	288	1236
39	28. Park	36.00 ACRE	7	0	7	7	7	14	180
39	TOTAL		4126	2621	6747	4987	6462	11449	110409
40	6. Single-Family Res.	446.00 DU	89	268	357	268	178	446	4460
40	7. Multi-Family Res.	390.00 DU	78	195	273	156	117	273	3120
40	8. Hillside Res. (EO)	447.00 DU	89	358	447	358	179	536	5364
40	9. General Commercial	91.50 TSF	82	73	156	265	284	549	6405
40	16. Hotel	200.00 ROOM	100	60	160	80	80	160	2400
40	21. Library	25.00 TSF	39	39	78	82	73	155	1138
40	27. Com. Recreation	84.10 ACRE	0	0	0	0	0	0	3364
40	TOTAL		478	992	1470	1209	911	2119	26251
41	6. Single-Family Res.	499.00 DU	100	299	399	299	200	499	4990
41	7. Multi-Family Res.	1404.00 DU	281	702	983	562	421	983	11232
41	8. Hillside Res. (EO)	2347.00 DU	469	1878	2347	1878	939	2816	28164
41	9. General Commercial	189.50 TSF	171	152	322	550	587	1137	13265
41	24. Elementary School	2800.00 STU	476	252	728	280	392	672	2884
41	28. Park	32.00 ACRE	6	0	6	6	6	13	160
41	30. Golf Course	355.00 ACRE	0	0	0	0	0	0	2130
41	TOTAL		1503	3283	4786	3575	2545	6120	62825

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
42	6. Single-Family Res.	50.00 DU	10	30	40	30	20	50	500
42	TOTAL		10	30	40	30	20	50	500
43	6. Single-Family Res.	300.00 DU	60	180	240	180	120	300	3000
43	TOTAL		60	180	240	180	120	300	3000
44	1. Res - Low	4.00 DU	1	2	3	2	2	4	40
44	3. Res - Med-High	217.00 DU	98	33	130	98	78	176	1541
44	9. General Commercial	95.40 TSF	86	76	162	277	296	572	6678
44	28. Park	0.50 ACRE	0	0	0	0	0	0	3
44	TOTAL		184	111	296	377	376	752	8261
45	1. Res - Low	380.00 DU	76	228	304	228	152	380	3800
45	2. Res - Medium	126.00 DU	68	23	91	68	54	122	1084
45	9. General Commercial	79.06 TSF	71	63	134	229	245	474	5534
45	11. Office	2.00 TSF	4	1	4	1	3	5	26
45	13. Industrial	24.80 TSF	21	3	24	3	23	26	173
45	24. Elementary School	576.00 STU	98	52	150	58	81	138	593
45	TOTAL		338	369	707	587	558	1145	11210
46	1. Res - Low	493.00 DU	99	296	394	296	197	493	4930
46	2. Res - Medium	3.00 DU	2	1	2	2	1	3	26
46	3. Res - Med-High	323.00 DU	145	48	194	145	116	262	2293
46	9. General Commercial	52.93 TSF	48	42	90	153	164	318	3705
46	22. Fire Station	1.70 ACRE	0	0	0	0	0	0	34
46	28. Park	7.60 ACRE	2	0	2	2	2	3	38
46	TOTAL		295	387	682	598	480	1078	11026
47	1. Res - Low	639.00 DU	128	383	511	383	256	639	6390
47	2. Res - Medium	270.00 DU	146	49	194	146	116	262	2322
47	3. Res - Med-High	2.00 DU	1	0	1	1	1	2	14
47	9. General Commercial	103.24 TSF	93	83	176	299	320	619	7227
47	22. Fire Station	0.20 ACRE	0	0	0	0	0	0	4
47	24. Elementary School	824.00 STU	140	74	214	82	115	198	849
47	28. Park	23.40 ACRE	5	0	5	5	5	9	117
47	TOTAL		512	589	1101	917	813	1729	16923
48	1. Res - Low	764.00 DU	153	458	611	458	306	764	7640
48	2. Res - Medium	684.00 DU	369	123	492	369	294	663	5882
48	9. General Commercial	67.95 TSF	61	54	116	197	211	408	4757
48	28. Park	1.80 ACRE	0	0	0	0	0	1	9
48	TOTAL		584	636	1220	1025	811	1836	18288
49	1. Res - Low	325.00 DU	65	195	260	195	130	325	3250
49	9. General Commercial	46.39 TSF	42	37	79	135	144	278	3247
49	11. Office	1.00 TSF	2	0	2	1	2	2	13
49	13. Industrial	8.70 TSF	7	1	8	1	8	9	61
49	TOTAL		116	233	349	331	283	615	6571
50	1. Res - Low	275.00 DU	55	165	220	165	110	275	2750
50	2. Res - Medium	75.00 DU	41	14	54	41	32	73	645
50	3. Res - Med-High	103.00 DU	46	15	62	46	37	83	731

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
50	9. General Commercial	194.06 TSF	175	155	330	563	602	1164	13584
50	22. Fire Station	0.10 ACRE	0	0	0	0	0	0	2
50	24. Elementary School	597.00 STU	101	54	155	60	84	143	615
50	TOTAL		418	403	821	874	864	1739	18327
51	2. Res - Medium	189.00 DU	102	34	136	102	81	183	1625
51	3. Res - Med-High	106.00 DU	48	16	64	48	38	86	753
51	9. General Commercial	284.88 TSF	256	228	484	826	883	1709	19942
51	TOTAL		406	278	684	976	1003	1978	22320
52	1. Res - Low	308.00 DU	62	185	246	185	123	308	3080
52	3. Res - Med-High	5.00 DU	2	1	3	2	2	4	36
52	9. General Commercial	30.71 TSF	28	25	52	89	95	184	2150
52	11. Office	62.51 TSF	119	19	138	38	106	144	813
52	26. High School	936.00 STU	206	66	271	122	103	225	1301
52	TOTAL		416	294	711	435	429	865	7379
53	1. Res - Low	1922.00 DU	384	1153	1538	1153	769	1922	19220
53	26. High School	1600.00 STU	352	112	464	208	176	384	2224
53	TOTAL		736	1265	2002	1361	945	2306	21444
54	1. Res - Low	690.00 DU	138	414	552	414	276	690	6900
54	2. Res - Medium	648.00 DU	350	117	467	350	279	629	5573
54	TOTAL		488	531	1019	764	555	1319	12473
55	1. Res - Low	568.00 DU	114	341	454	341	227	568	5680
55	2. Res - Medium	50.00 DU	27	9	36	27	22	49	430
55	11. Office	5.00 TSF	10	2	11	3	9	12	65
55	13. Industrial	75.70 TSF	64	9	73	9	69	78	528
55	24. Elementary School	626.00 STU	106	56	163	63	88	150	645
55	TOTAL		320	417	737	442	414	856	7347
56	1. Res - Low	103.00 DU	21	62	82	62	41	103	1030
56	2. Res - Medium	14.00 DU	8	3	10	8	6	14	120
56	3. Res - Med-High	87.00 DU	39	13	52	39	31	70	618
56	9. General Commercial	507.04 TSF	456	406	862	1470	1572	3042	35493
56	26. High School	1481.00 STU	326	104	429	193	163	355	2059
56	TOTAL		849	587	1436	1771	1813	3585	39319
57	1. Res - Low	348.00 DU	70	209	278	209	139	348	3480
57	2. Res - Medium	71.00 DU	38	13	51	38	31	69	611
57	3. Res - Med-High	373.00 DU	168	56	224	168	134	302	2648
57	9. General Commercial	6.53 TSF	6	5	11	19	20	39	457
57	11. Office	5.00 TSF	10	2	11	3	9	12	65
57	13. Industrial	77.00 TSF	65	9	74	9	70	79	537
57	21. Library	4.36 TSF	7	7	14	14	13	27	198
57	22. Fire Station	1.50 ACRE	0	0	0	0	0	0	30
57	28. Park	5.90 ACRE	1	0	1	1	1	2	30
57	TOTAL		364	300	664	462	417	878	8056
58	1. Res - Low	412.00 DU	82	247	330	247	165	412	4120
58	3. Res - Med-High	223.00 DU	100	33	134	100	80	181	1583

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
58	9. General Commercial	122.19 TSF	110	98	208	354	379	733	8553
58	24. Elementary School	880.00 STU	150	79	229	88	123	211	906
58	TOTAL		442	458	900	790	747	1537	15163
59	2. Res - Medium	97.00 DU	52	17	70	52	42	94	834
59	3. Res - Med-High	218.00 DU	98	33	131	98	78	177	1548
59	9. General Commercial	180.99 TSF	163	145	308	525	561	1086	12669
59	24. Elementary School	421.00 STU	72	38	109	42	59	101	434
59	TOTAL		385	233	618	717	740	1458	15485
60	3. Res - Med-High	228.00 DU	103	34	137	103	82	185	1619
60	9. General Commercial	110.42 TSF	99	88	188	320	342	663	7729
60	25. Junior High School	601.00 STU	102	54	156	60	84	144	619
60	TOTAL		304	177	481	483	509	991	9967
61	1. Res - Low	365.00 DU	73	219	292	219	146	365	3650
61	24. Elementary School	139.00 STU	24	13	36	14	19	33	143
61	TOTAL		97	232	328	233	165	398	3793
62	1. Res - Low	581.00 DU	116	349	465	349	232	581	5810
62	11. Office	38.12 TSF	72	11	84	23	65	88	496
62	24. Elementary School	559.00 STU	95	50	145	56	78	134	576
62	28. Park	3.20 ACRE	1	0	1	1	1	1	16
62	TOTAL		284	410	695	428	376	804	6897
63	1. Res - Low	4.00 DU	1	2	3	2	2	4	40
63	3. Res - Med-High	490.00 DU	221	74	294	221	176	397	3479
63	9. General Commercial	214.32 TSF	193	171	364	622	664	1286	15002
63	25. Junior High School	701.00 STU	119	63	182	70	98	168	722
63	TOTAL		533	310	844	915	941	1855	19243
64	1. Res - Low	780.00 DU	156	468	624	468	312	780	7800
64	11. Office	32.02 TSF	61	10	70	19	54	74	416
64	22. Fire Station	0.20 ACRE	0	0	0	0	0	0	4
64	24. Elementary School	385.00 STU	65	35	100	39	54	92	397
64	TOTAL		282	512	795	526	420	946	8617
65	1. Res - Low	684.00 DU	137	410	547	410	274	684	6840
65	2. Res - Medium	467.00 DU	252	84	336	252	201	453	4016
65	3. Res - Med-High	634.00 DU	285	95	380	285	228	514	4501
65	22. Fire Station	1.50 ACRE	0	0	0	0	0	0	30
65	24. Elementary School	800.00 STU	136	72	208	80	112	192	824
65	28. Park	4.70 ACRE	1	0	1	1	1	2	24
65	TOTAL		811	662	1473	1029	816	1844	16235
66	1. Res - Low	268.00 DU	54	161	214	161	107	268	2680
66	2. Res - Medium	132.00 DU	71	24	95	71	57	128	1135
66	9. General Commercial	3.92 TSF	4	3	7	11	12	24	274
66	TOTAL		128	188	316	243	176	420	4090
67	1. Res - Low	154.00 DU	31	92	123	92	62	154	1540
67	2. Res - Medium	398.00 DU	215	72	287	215	171	386	3423

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
67	3. Res - Med-High	106.00 DU	48	16	64	48	38	86	753
67	9. General Commercial	254.83 TSF	229	204	433	739	790	1529	17938
67	19. Hospital	99.00 BED	76	30	106	46	75	121	1163
67	24. Elementary School	453.00 STU	77	41	118	45	63	109	467
67	26. High School	1348.00 STU	297	94	391	175	148	324	1874
67	TOTAL		973	549	1521	1360	1348	2708	27057
68	1. Res - Low	211.00 DU	42	127	169	127	84	211	2110
68	28. Park	28.70 ACRE	6	0	6	6	6	11	144
68	TOTAL		48	127	175	132	90	222	2254
69	1. Res - Low	580.00 DU	116	348	464	348	232	580	5800
69	2. Res - Medium	255.00 DU	138	46	184	138	110	247	2193
69	3. Res - Med-High	181.00 DU	81	27	109	81	65	147	1285
69	9. General Commercial	37.24 TSF	34	30	63	108	115	223	2607
69	24. Elementary School	1200.00 STU	204	108	312	120	168	288	1236
69	TOTAL		573	559	1132	795	690	1485	13121
70	1. Res - Low	287.00 DU	57	172	230	172	115	287	2870
70	2. Res - Medium	221.00 DU	119	40	159	119	95	214	1901
70	3. Res - Med-High	167.00 DU	75	25	100	75	60	135	1186
70	9. General Commercial	65.34 TSF	59	52	111	189	203	392	4574
70	TOTAL		311	289	600	556	473	1029	10530
71	1. Res - Low	1142.00 DU	228	685	914	685	457	1142	11420
71	22. Fire Station	1.80 ACRE	0	0	0	0	0	0	36
71	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
71	28. Park	0.10 ACRE	0	0	0	0	0	0	1
71	TOTAL		330	739	1070	745	541	1286	12075
72	1. Res - Low	315.00 DU	63	189	252	189	126	315	3150
72	2. Res - Medium	162.00 DU	87	29	117	87	70	157	1393
72	9. General Commercial	30.71 TSF	28	25	52	89	95	184	2150
72	25. Junior High School	1600.00 STU	272	144	416	160	224	384	1648
72	TOTAL		450	387	837	526	515	1040	8341
73	1. Res - Low	173.00 DU	35	104	138	104	69	173	1730
73	2. Res - Medium	871.00 DU	470	157	627	470	375	845	7491
73	TOTAL		505	261	766	574	444	1018	9221
74	1. Res - Low	891.00 DU	178	535	713	535	356	891	8910
74	23. Cemetary	6.90 ACRE	0	0	0	0	0	0	29
74	TOTAL		178	535	713	535	356	891	8939
75	1. Res - Low	138.00 DU	28	83	110	83	55	138	1380
75	2. Res - Medium	6.00 DU	3	1	4	3	3	6	52
75	9. General Commercial	2.61 TSF	2	2	4	8	8	16	183
75	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
75	28. Park	9.40 ACRE	2	0	2	2	2	4	47
75	TOTAL		137	140	277	155	152	307	2279
76	1. Res - Low	274.00 DU	55	164	219	164	110	274	2740
76	TOTAL		55	164	219	164	110	274	2740

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
77	1. Res - Low	554.00 DU	111	332	443	332	222	554	5540
77	2. Res - Medium	83.00 DU	45	15	60	45	36	81	714
77	9. General Commercial	113.04 TSF	102	90	192	328	350	678	7913
77	TOTAL		257	438	695	705	608	1313	14167
78	1. Res - Low	559.00 DU	112	335	447	335	224	559	5590
78	TOTAL		112	335	447	335	224	559	5590
79	1. Res - Low	415.00 DU	83	249	332	249	166	415	4150
79	3. Res - Med-High	189.00 DU	85	28	113	85	68	153	1342
79	9. General Commercial	92.13 TSF	83	74	157	267	286	553	6449
79	22. Fire Station	0.30 ACRE	0	0	0	0	0	0	6
79	25. Junior High School	1600.00 STU	272	144	416	160	224	384	1648
79	28. Park	4.90 ACRE	1	0	1	1	1	2	25
79	TOTAL		524	495	1019	762	745	1507	13620
80	1. Res - Low	630.00 DU	126	378	504	378	252	630	6300
80	28. Park	0.40 ACRE	0	0	0	0	0	0	2
80	TOTAL		126	378	504	378	252	630	6302
81	1. Res - Low	389.00 DU	78	233	311	233	156	389	3890
81	2. Res - Medium	202.00 DU	109	36	145	109	87	196	1737
81	9. General Commercial	49.66 TSF	45	40	84	144	154	298	3476
81	21. Library	39.20 TSF	61	61	122	129	114	243	1784
81	22. Fire Station	2.20 ACRE	0	0	0	0	0	0	44
81	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
81	28. Park	0.40 ACRE	0	0	0	0	0	0	2
81	TOTAL		394	425	819	675	595	1270	11551
82	1. Res - Low	581.00 DU	116	349	465	349	232	581	5810
82	2. Res - Medium	300.00 DU	162	54	216	162	129	291	2580
82	3. Res - Med-High	87.00 DU	39	13	52	39	31	70	618
82	9. General Commercial	64.03 TSF	58	51	109	186	198	384	4482
82	28. Park	6.60 ACRE	1	0	1	1	1	3	33
82	TOTAL		376	467	843	737	593	1329	13523
83	1. Res - Low	250.00 DU	50	150	200	150	100	250	2500
83	2. Res - Medium	175.00 DU	95	32	126	95	75	170	1505
83	9. General Commercial	19.60 TSF	18	16	33	57	61	118	1372
83	TOTAL		162	197	359	301	236	537	5377
84	1. Res - Low	789.00 DU	158	473	631	473	316	789	7890
84	TOTAL		158	473	631	473	316	789	7890
85	1. Res - Low	572.00 DU	114	343	458	343	229	572	5720
85	11. Office	36.59 TSF	70	11	80	22	62	84	476
85	24. Elementary School	453.00 STU	77	41	118	45	63	109	467
85	25. Junior High School	772.00 STU	131	69	201	77	108	185	795
85	28. Park	0.20 ACRE	0	0	0	0	0	0	1
85	TOTAL		392	464	857	488	463	950	7458
86	1. Res - Low	212.00 DU	42	127	170	127	85	212	2120

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
86	2. Res - Medium	1.00 DU	1	0	1	1	0	1	9
86	3. Res - Med-High	51.00 DU	23	8	31	23	18	41	362
86	TOTAL		66	135	201	151	104	254	2491
87	1. Res - Low	851.00 DU	170	511	681	511	340	851	8510
87	9. General Commercial	88.21 TSF	79	71	150	256	273	529	6175
87	11. Office	39.64 TSF	75	12	87	24	67	91	515
87	TOTAL		325	593	918	790	681	1471	15200
88	1. Res - Low	318.00 DU	64	191	254	191	127	318	3180
88	2. Res - Medium	165.00 DU	89	30	119	89	71	160	1419
88	TOTAL		153	221	373	280	198	478	4599
89	1. Res - Low	509.00 DU	102	305	407	305	204	509	5090
89	TOTAL		102	305	407	305	204	509	5090
90	1. Res - Low	875.00 DU	175	525	700	525	350	875	8750
90	2. Res - Medium	11.00 DU	6	2	8	6	5	11	95
90	9. General Commercial	11.76 TSF	11	9	20	34	36	71	823
90	TOTAL		192	536	728	565	391	956	9668
91	1. Res - Low	609.00 DU	122	365	487	365	244	609	6090
91	24. Elementary School	494.00 STU	84	44	128	49	69	119	509
91	24. Elementary School	581.00 STU	99	52	151	58	81	139	598
91	TOTAL		305	462	767	473	394	867	7197
92	1. Res - Low	181.00 DU	36	109	145	109	72	181	1810
92	2. Res - Medium	764.00 DU	413	138	550	413	329	741	6570
92	3. Res - Med-High	360.00 DU	162	54	216	162	130	292	2556
92	9. General Commercial	70.57 TSF	64	56	120	205	219	423	4940
92	22. Fire Station	2.60 ACRE	0	0	0	0	0	0	52
92	28. Park	10.10 ACRE	2	0	2	2	2	4	51
92	TOTAL		676	357	1033	890	751	1641	15979
93	1. Res - Low	88.00 DU	18	53	70	53	35	88	880
93	2. Res - Medium	53.00 DU	29	10	38	29	23	51	456
93	3. Res - Med-High	36.00 DU	16	5	22	16	13	29	256
93	28. Park	71.50 ACRE	14	0	14	14	14	29	358
93	TOTAL		77	68	144	112	85	197	1949
94	1. Res - Low	8.00 DU	2	5	6	5	3	8	80
94	25. Junior High School	732.00 STU	124	66	190	73	102	176	754
94	28. Park	76.30 ACRE	15	0	15	15	15	31	382
94	TOTAL		141	71	212	93	121	214	1215
95	1. Res - Low	22.00 DU	4	13	18	13	9	22	220
95	TOTAL		4	13	18	13	9	22	220
96	6. Single-Family Res.	78.00 DU	16	47	62	47	31	78	780
96	18. Total Employment	85.00 EMP	20	3	22	6	15	21	221
96	TOTAL		35	49	85	53	47	99	1001

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
97	6. Single-Family Res.	1789.00 DU	358	1073	1431	1073	716	1789	17890
97	7. Multi-Family Res.	7.00 DU	1	4	5	3	2	5	56
97	18. Total Employment	606.00 EMP	139	18	158	42	109	152	1576
97	TOTAL		499	1095	1594	1119	827	1945	19522
98	6. Single-Family Res.	1278.00 DU	256	767	1022	767	511	1278	12780
98	7. Multi-Family Res.	1675.00 DU	335	838	1173	670	503	1173	13400
98	18. Total Employment	35.00 EMP	8	1	9	2	6	9	91
98	TOTAL		599	1605	2204	1439	1020	2459	26271
99	2. Res - Medium	244.00 DU	132	44	176	132	105	237	2098
99	9. General Commercial	70.57 TSF	64	56	120	205	219	423	4940
99	11. Office	1595.00 TSF	3031	479	3509	957	2712	3669	20735
99	13. Industrial	1306.00 TSF	1097	157	1254	157	1188	1345	9103
99	TOTAL		4323	736	5058	1450	4224	5674	36876
100	9. General Commercial	2.07 TSF	2	2	4	6	6	12	145
100	11. Office	319.00 TSF	606	96	702	191	542	734	4147
100	13. Industrial	3913.00 TSF	3287	470	3756	470	3561	4030	27274
100	TOTAL		3895	567	4462	667	4110	4777	31566
101	11. Office	60.00 TSF	114	18	132	36	102	138	780
101	13. Industrial	848.00 TSF	712	102	814	102	772	873	5911
101	TOTAL		826	120	946	138	874	1011	6691
102	9. General Commercial	153.88 TSF	138	123	262	446	477	923	10772
102	11. Office	3324.00 TSF	6316	997	7313	1994	5651	7645	43212
102	13. Industrial	648.00 TSF	544	78	622	78	590	667	4517
102	TOTAL		6998	1198	8196	2518	6718	9236	58500
103	9. General Commercial	0.65 TSF	1	1	1	2	2	4	46
103	11. Office	137.00 TSF	260	41	301	82	233	315	1781
103	13. Industrial	1761.00 TSF	1479	211	1691	211	1603	1814	12274
103	TOTAL		1740	253	1993	295	1837	2133	14101
104	9. General Commercial	83.20 TSF	75	67	141	241	258	499	5824
104	11. Office	1564.00 TSF	2972	469	3441	938	2659	3597	20332
104	13. Industrial	1022.00 TSF	858	123	981	123	930	1053	7123
104	TOTAL		3905	658	4563	1302	3847	5149	33279
105	9. General Commercial	35.28 TSF	32	28	60	102	109	212	2470
105	11. Office	875.00 TSF	1663	263	1925	525	1488	2013	11375
105	13. Industrial	1753.00 TSF	1473	210	1683	210	1595	1806	12218
105	TOTAL		3167	501	3668	838	3192	4030	26063
106	2. Res - Medium	143.00 DU	77	26	103	77	61	139	1230
106	3. Res - Med-High	129.00 DU	58	19	77	58	46	104	916
106	9. General Commercial	28.75 TSF	26	23	49	83	89	173	2013
106	11. Office	32.00 TSF	61	10	70	19	54	74	416
106	13. Industrial	450.60 TSF	379	54	433	54	410	464	3141
106	TOTAL		600	132	732	292	662	953	7715

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
107	11. Office	103.00 TSF	196	31	227	62	175	237	1339
107	13. Industrial	1471.10 TSF	1236	177	1412	177	1339	1515	10254
107	TOTAL		1431	207	1639	238	1514	1752	11593
108	2. Res - Medium	44.00 DU	24	8	32	24	19	43	373
108	3. Res - Med-High	288.00 DU	130	43	173	130	104	233	2045
108	9. General Commercial	13.72 TSF	12	11	23	40	43	82	960
108	11. Office	33.00 TSF	63	10	73	20	56	76	429
108	13. Industrial	474.20 TSF	398	57	455	57	432	488	3305
108	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
108	TOTAL		729	183	912	330	737	1067	7736
109	11. Office	3711.00 TSF	7051	1113	8164	2227	6309	8535	48243
109	9. General Commercial	469.00 TSF	422	375	797	1360	1454	2814	32830
109	35. Anaheim Stadium-SG	124.60 ACRE	0	0	0	0	0	0	0
109	TOTAL		7473	1489	8962	3587	7763	11349	81073
110	2. Res - Medium	256.00 DU	138	46	184	138	110	248	2202
110	9. General Commercial	572.05 TSF	515	458	972	1659	1773	3432	40044
110	11. Office	3033.00 TSF	5763	910	6673	1820	5156	6976	39429
110	13. Industrial	45.00 TSF	38	5	43	5	41	46	314
110	TOTAL		6454	1419	7873	3622	7080	10703	81988
111	1. Res - Low	38.00 DU	8	23	30	23	15	38	380
111	3. Res - Med-High	60.00 DU	27	9	36	27	22	49	426
111	9. General Commercial	80.59 TSF	73	64	137	234	250	484	5641
111	11. Office	1212.00 TSF	2303	364	2666	727	2060	2788	15756
111	13. Industrial	1407.00 TSF	1182	169	1351	169	1280	1449	9807
111	TOTAL		3592	629	4221	1180	3627	4807	32010
112	1. Res - Low	485.00 DU	97	291	388	291	194	485	4850
112	2. Res - Medium	109.00 DU	59	20	78	59	47	106	937
112	3. Res - Med-High	65.00 DU	29	10	39	29	23	53	462
112	9. General Commercial	216.28 TSF	195	173	368	627	670	1298	15140
112	11. Office	150.94 TSF	287	45	332	91	257	347	1962
112	13. Industrial	14.37 TSF	12	2	14	2	13	15	100
112	22. Fire Station	1.40 ACRE	0	0	0	0	0	0	28
112	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
112	25. Junior High School	1600.00 STU	272	144	416	160	224	384	1648
112	28. Park	25.90 ACRE	5	0	5	5	5	10	130
112	TOTAL		1058	738	1796	1324	1518	2841	25874
113	1. Res - Low	315.00 DU	63	189	252	189	126	315	3150
113	3. Res - Med-High	6.00 DU	3	1	4	3	2	5	43
113	9. General Commercial	49.01 TSF	44	39	83	142	152	294	3431
113	13. Industrial	1.31 TSF	1	0	1	0	1	1	9
113	22. Fire Station	0.30 ACRE	0	0	0	0	0	0	6
113	28. Park	1.30 ACRE	0	0	0	0	0	1	7
113	TOTAL		111	229	340	334	282	616	6645
114	1. Res - Low	61.00 DU	12	37	49	37	24	61	610
114	3. Res - Med-High	12.00 DU	5	2	7	5	4	10	85

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
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114	9. General Commercial	148.43 TSF	134	119	252	430	460	891	10390
114	11. Office	885.57 TSF	1683	266	1948	531	1505	2037	11512
114	22. Fire Station	1.30 ACRE	0	0	0	0	0	0	26
114	TOTAL		1834	423	2257	1004	1994	2998	22624
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115	2. Res - Medium	443.00 DU	239	80	319	239	190	430	3810
115	3. Res - Med-High	2.00 DU	1	0	1	1	1	2	14
115	9. General Commercial	400.00 TSF	360	320	680	1160	1240	2400	28000
115	10. Regional Commerical	628.30 TSF	251	126	377	880	942	1822	21991
115	11. Office	3150.00 TSF	5985	945	6930	1890	5355	7245	40950
115	16. Hotel	460.00 ROOM	230	138	368	184	184	368	5520
115	TOTAL		7066	1609	8675	4354	7913	12266	100285
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116	9. General Commercial	51.84 TSF	47	41	88	150	161	311	3629
116	11. Office	130.68 TSF	248	39	287	78	222	301	1699
116	12. Medical Office	63.24 TSF	58	46	103	62	168	230	2161
116	19. Hospital	496.00 BED	382	149	531	228	377	605	5828
116	29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500
116	TOTAL		1098	379	1477	584	1473	2057	19817
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117	3. Res - Med-High	828.00 DU	373	124	497	373	298	671	5879
117	9. General Commercial	11.00 TSF	10	9	19	32	34	66	770
117	11. Office	1000.00 TSF	1900	300	2200	600	1700	2300	13000
117	TOTAL		2283	433	2716	1005	2032	3037	19649
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118	1. Res - Low	421.00 DU	84	253	337	253	168	421	4210
118	2. Res - Medium	195.00 DU	105	35	140	105	84	189	1677
118	3. Res - Med-High	815.00 DU	367	122	489	367	293	660	5787
118	9. General Commercial	452.00 TSF	407	362	768	1311	1401	2712	31640
118	11. Office	1248.70 TSF	2373	375	2747	749	2123	2872	16233
118	28. Park	6.60 ACRE	1	0	1	1	1	3	33
118	TOTAL		3337	1146	4483	2786	4071	6857	59580
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119	1. Res - Low	36.00 DU	7	22	29	22	14	36	360
119	2. Res - Medium	188.00 DU	102	34	135	102	81	182	1617
119	3. Res - Med-High	46.00 DU	21	7	28	21	17	37	327
119	9. General Commercial	270.40 TSF	243	216	460	784	838	1622	18928
119	11. Office	824.16 TSF	1566	247	1813	494	1401	1896	10714
119	19. Hospital	690.00 BED	531	207	738	317	524	842	8108
119	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
119	TOTAL		2572	787	3359	1800	2960	4759	40671
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120	1. Res - Low	46.00 DU	9	28	37	28	18	46	460
120	2. Res - Medium	318.00 DU	172	57	229	172	137	308	2735
120	3. Res - Med-High	462.00 DU	208	69	277	208	166	374	3280
120	34. Specialty Comm.	70.00 TSF	28	14	42	98	105	203	2450
120	11. Office	421.00 TSF	800	126	926	253	716	968	5473
120	13. Industrial	117.00 TSF	98	14	112	14	106	121	815
120	19. Hospital	110.00 BED	85	33	118	51	84	134	1293
120	TOTAL		1400	341	1741	822	1332	2155	16506
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121	6. Single-Family Res.	171.00 DU	34	103	137	103	68	171	1710

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
121	7. Multi-Family Res.	532.00 DU	106	266	372	213	160	372	4256
121	17. Retail Employment	814.00 EMP	488	114	602	415	602	1018	11762
121	18. Total Employment	5512.00 EMP	1268	165	1433	386	992	1378	14331
121	TOTAL		1897	648	2545	1116	1823	2939	32060
122	3. Res - Med-High	15.00 DU	7	2	9	7	5	12	107
122	9. General Commercial	400.75 TSF	361	321	681	1162	1242	2405	28053
122	11. Office	3100.00 TSF	5890	930	6820	1860	5270	7130	40300
122	TOTAL		6257	1253	7510	3029	6518	9547	68459
123	1. Res - Low	502.00 DU	100	301	402	301	201	502	5020
123	2. Res - Medium	10.00 DU	5	2	7	5	4	10	86
123	3. Res - Med-High	8.00 DU	4	1	5	4	3	6	57
123	9. General Commercial	165.96 TSF	149	133	282	481	514	996	11617
123	TOTAL		259	437	696	791	722	1514	16780
124	1. Res - Low	380.00 DU	76	228	304	228	152	380	3800
124	2. Res - Medium	36.00 DU	19	6	26	19	15	35	310
124	3. Res - Med-High	165.00 DU	74	25	99	74	59	134	1172
124	9. General Commercial	38.11 TSF	34	30	65	111	118	229	2668
124	11. Office	2.18 TSF	4	1	5	1	4	5	28
124	26. High School	2500.00 STU	550	175	725	325	275	600	3475
124	TOTAL		758	465	1224	759	624	1382	11452
125	1. Res - Low	258.00 DU	52	155	206	155	103	258	2580
125	2. Res - Medium	72.00 DU	39	13	52	39	31	70	619
125	3. Res - Med-High	119.00 DU	54	18	71	54	43	96	845
125	9. General Commercial	237.18 TSF	213	190	403	688	735	1423	16603
125	24. Elementary School	800.00 STU	136	72	208	80	112	192	824
125	25. Junior High School	1600.00 STU	272	144	416	160	224	384	1648
125	TOTAL		765	591	1357	1175	1248	2423	23119
126	1. Res - Low	545.00 DU	109	327	436	327	218	545	5450
126	9. General Commercial	120.88 TSF	109	97	205	351	375	725	8462
126	TOTAL		218	424	641	678	593	1270	13912
127	1. Res - Low	222.00 DU	44	133	178	133	89	222	2220
127	3. Res - Med-High	40.00 DU	18	6	24	18	14	32	284
127	9. General Commercial	19.60 TSF	18	16	33	57	61	118	1372
127	13. Industrial	9.15 TSF	8	1	9	1	8	9	64
127	21. Library	37.03 TSF	57	58	115	121	108	230	1685
127	TOTAL		145	214	359	331	280	611	5625
128	1. Res - Low	299.00 DU	60	179	239	179	120	299	2990
128	9. General Commercial	55.54 TSF	50	44	94	161	172	333	3888
128	21. Library	2.18 TSF	3	3	7	7	6	14	99
128	TOTAL		113	227	340	348	298	646	6977
129	1. Res - Low	126.00 DU	25	76	101	76	50	126	1260
129	3. Res - Med-High	197.00 DU	89	30	118	89	71	160	1399
129	9. General Commercial	66.65 TSF	60	53	113	193	207	400	4666
129	13. Industrial	6.53 TSF	5	1	6	1	6	7	46
129	TOTAL		179	159	339	358	334	692	7370

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
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130	1. Res - Low	104.00 DU	21	62	83	62	42	104	1040
130	2. Res - Medium	100.00 DU	54	18	72	54	43	97	860
130	3. Res - Med-High	6.00 DU	3	1	4	3	2	5	43
130	9. General Commercial	182.30 TSF	164	146	310	529	565	1094	12761
130	TOTAL		242	227	469	648	652	1300	14704
131	1. Res - Low	16.00 DU	3	10	13	10	6	16	160
131	2. Res - Medium	244.00 DU	132	44	176	132	105	237	2093
131	3. Res - Med-High	602.00 DU	271	90	361	271	217	488	4274
131	34. Specialty Comm.	104.00 TSF	42	21	62	146	156	302	3640
131	11. Office	203.00 TSF	386	61	447	122	345	467	2639
131	13. Industrial	670.00 TSF	563	80	643	80	610	690	4670
131	TOTAL		1396	306	1702	760	1439	2199	17482
132	1. Res - Low	153.00 DU	31	92	122	92	61	153	1530
132	2. Res - Medium	448.00 DU	242	81	323	242	193	435	3853
132	3. Res - Med-High	135.00 DU	61	20	81	61	49	109	959
132	34. Specialty Comm.	115.00 TSF	46	23	69	161	173	334	4025
132	11. Office	172.00 TSF	327	52	378	103	292	396	2236
132	21. Library	52.27 TSF	81	82	163	171	153	324	2378
132	32. College	2160.00 STU	324	65	389	86	173	259	3348
132	TOTAL		1111	414	1525	917	1093	2009	18329
133	2. Res - Medium	18.00 DU	10	3	13	10	8	17	155
133	3. Res - Med-High	1121.00 DU	504	168	673	504	404	908	7959
133	34. Specialty Comm.	139.00 TSF	56	28	83	195	209	403	4865
133	11. Office	149.00 TSF	283	45	328	89	253	343	1937
133	13. Industrial	124.00 TSF	104	15	119	15	113	128	864
133	28. Park	2.30 ACRE	0	0	0	0	0	1	12
133	TOTAL		957	259	1216	814	986	1800	15792
134	1. Res - Low	98.00 DU	20	59	78	59	39	98	980
134	2. Res - Medium	230.00 DU	124	41	166	124	99	223	1978
134	3. Res - Med-High	99.00 DU	45	15	59	45	36	80	703
134	11. Office	16.77 TSF	32	5	37	10	29	39	218
134	28. Park	38.10 ACRE	8	0	8	8	8	15	191
134	TOTAL		228	120	348	245	210	455	4069
135	1. Res - Low	372.00 DU	74	223	298	223	149	372	3720
135	2. Res - Medium	170.00 DU	92	31	122	92	73	165	1462
135	3. Res - Med-High	122.00 DU	55	18	73	55	44	99	866
135	34. Specialty Comm.	151.00 TSF	60	30	91	211	227	438	5285
135	11. Office	228.00 TSF	433	68	502	137	388	524	2964
135	21. Library	2.18 TSF	3	3	7	7	6	14	99
135	22. Fire Station	1.50 ACRE	0	0	0	0	0	0	30
135	33. Government Office	93.00 TSF	459	87	547	759	267	1026	6410
135	TOTAL		1177	462	1639	1484	1153	2637	20837
136	6. Single-Family Res.	247.00 DU	49	148	198	148	99	247	2470
136	7. Multi-Family Res.	448.00 DU	90	224	314	179	134	314	3584
136	17. Retail Employment	101.00 EMP	61	14	75	52	75	126	1459
136	18. Total Employment	1138.00 EMP	262	34	296	80	205	285	2959
136	TOTAL		461	420	882	459	513	971	10472

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
137	1. Res - Low	525.00 DU	105	315	420	315	210	525	5250
137	9. General Commercial	74.27 TSF	67	59	126	215	230	446	5199
137	11. Office	138.30 TSF	263	41	304	33	235	318	1798
137	24. Elementary School	600.00 STU	102	54	156	60	34	144	613
137	TOTAL		537	470	1007	673	759	1433	12865
138	1. Res - Low	132.00 DU	26	79	106	79	53	132	1320
138	2. Res - Medium	120.00 DU	65	22	86	65	52	116	1032
138	3. Res - Med-High	92.00 DU	41	14	55	41	33	75	653
138	9. General Commercial	169.88 TSF	153	136	289	493	527	1019	11692
138	TOTAL		285	251	536	678	664	1342	14897
139	1. Res - Low	188.00 DU	38	113	150	113	75	188	1880
139	2. Res - Medium	10.00 DU	5	2	7	5	4	10	36
139	3. Res - Med-High	140.00 DU	63	21	84	63	50	113	994
139	9. General Commercial	137.87 TSF	124	110	234	400	427	827	9651
139	TOTAL		230	246	476	581	557	1138	12611
140	1. Res - Low	658.00 DU	132	395	526	395	263	658	6580
140	2. Res - Medium	198.00 DU	107	36	143	107	85	192	1703
140	9. General Commercial	99.53 TSF	90	80	169	289	309	597	6967
140	11. Office	154.00 TSF	293	46	339	92	262	354	2002
140	22. Fire Station	4.00 ACRE	0	0	0	0	0	0	80
140	24. Elementary School	600.00 STU	102	54	156	60	34	144	613
140	TOTAL		723	610	1333	943	1003	1945	17950
141	1. Res - Low	78.00 DU	16	47	62	47	31	78	780
141	2. Res - Medium	123.00 DU	66	22	89	66	53	119	1058
141	9. General Commercial	97.36 TSF	88	78	166	282	302	584	6815
141	11. Office	807.50 TSF	1534	242	1777	485	1373	1857	10498
141	11. Office	36.59 TSF	70	11	80	22	62	84	476
141	TOTAL		1773	400	2173	902	1821	2723	19626
142	2. Res - Medium	395.00 DU	213	71	284	213	170	383	3397
142	3. Res - Med-High	378.00 DU	170	57	227	170	136	306	2684
142	9. General Commercial	114.35 TSF	103	91	194	332	354	686	8005
142	TOTAL		486	219	706	715	660	1375	14085
143	6. Single-Family Res.	511.00 DU	102	307	409	307	204	511	5110
143	7. Multi-Family Res.	909.00 DU	182	455	636	364	273	636	7272
143	17. Retail Employment	611.00 EMP	367	86	452	312	452	764	8829
143	18. Total Employment	2366.00 EMP	544	71	615	166	426	592	6152
143	TOTAL		1195	918	2112	1147	1355	2503	27363
144	6. Single-Family Res.	511.00 DU	102	307	409	307	204	511	5110
144	7. Multi-Family Res.	909.00 DU	182	455	636	364	273	636	7272
144	17. Retail Employment	611.00 EMP	367	86	452	312	452	764	8829
144	18. Total Employment	2366.00 EMP	544	71	615	166	426	592	6152
144	TOTAL		1195	918	2112	1147	1355	2503	27363
145	6. Single-Family Res.	437.00 DU	87	262	350	262	175	437	4370
145	7. Multi-Family Res.	778.00 DU	156	389	545	311	233	545	6224

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
145	17. Retail Employment	522.00 EMP	313	73	386	266	386	653	7543
145	18. Total Employment	2024.00 EMP	466	61	526	142	364	506	5262
145	TOTAL		1022	785	1807	981	1159	2140	23399
146	6. Single-Family Res.	687.00 DU	137	412	550	412	275	687	6870
146	7. Multi-Family Res.	1222.00 DU	244	611	855	489	367	855	9776
146	17. Retail Employment	821.00 EMP	493	115	608	419	608	1026	11863
146	18. Total Employment	3181.00 EMP	732	95	827	223	573	795	8271
146	TOTAL		1606	1234	2840	1542	1822	3364	36780
147	6. Single-Family Res.	125.00 DU	25	75	100	75	50	125	1250
147	7. Multi-Family Res.	222.00 DU	44	111	155	89	67	155	1776
147	17. Retail Employment	149.00 EMP	89	21	110	76	110	186	2153
147	18. Total Employment	578.00 EMP	133	17	150	40	104	145	1503
147	TOTAL		292	224	516	280	331	611	6682
148	6. Single-Family Res.	1033.00 DU	207	620	826	620	413	1033	10330
148	7. Multi-Family Res.	2755.00 DU	551	1378	1929	1102	827	1929	22040
148	17. Retail Employment	1154.00 EMP	692	162	854	589	854	1443	16675
148	18. Total Employment	12040.00 EMP	2769	361	3130	843	2167	3010	31304
148	TOTAL		4219	2520	6739	3153	4261	7414	80349
149	6. Single-Family Res.	466.00 DU	93	280	373	280	186	466	4660
149	7. Multi-Family Res.	510.00 DU	102	255	357	204	153	357	4080
149	17. Retail Employment	266.00 EMP	160	37	197	136	197	333	3844
149	18. Total Employment	773.00 EMP	178	23	201	54	139	193	2010
149	TOTAL		533	595	1128	673	675	1349	14594
150	6. Single-Family Res.	700.00 DU	140	420	560	420	280	700	7000
150	7. Multi-Family Res.	765.00 DU	153	383	536	306	230	536	6120
150	17. Retail Employment	398.00 EMP	239	56	295	203	295	498	5751
150	18. Total Employment	1160.00 EMP	267	35	302	81	209	290	3016
150	TOTAL		799	893	1692	1010	1013	2023	21887
151	6. Single-Family Res.	372.00 DU	74	223	298	223	149	372	3720
151	7. Multi-Family Res.	51.00 DU	10	26	36	20	15	36	408
151	18. Total Employment	197.00 EMP	45	6	51	14	35	49	512
151	TOTAL		130	255	385	257	200	457	4640
152	6. Single-Family Res.	557.00 DU	111	334	446	334	223	557	5570
152	7. Multi-Family Res.	77.00 DU	15	39	54	31	23	54	616
152	18. Total Employment	295.00 EMP	68	9	77	21	53	74	767
152	TOTAL		195	382	576	386	299	685	6953
153	6. Single-Family Res.	372.00 DU	74	223	298	223	149	372	3720
153	7. Multi-Family Res.	51.00 DU	10	26	36	20	15	36	408
153	18. Total Employment	197.00 EMP	45	6	51	14	35	49	512
153	TOTAL		130	255	385	257	200	457	4640
154	6. Single-Family Res.	557.00 DU	111	334	446	334	223	557	5570
154	7. Multi-Family Res.	77.00 DU	15	39	54	31	23	54	616
154	18. Total Employment	295.00 EMP	68	9	77	21	53	74	767
154	TOTAL		195	382	576	386	299	685	6953

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
155	6. Single-Family Res.	465.00 DU	93	279	372	279	186	465	4650
155	7. Multi-Family Res.	64.00 DU	13	32	45	26	19	45	512
155	18. Total Employment	246.00 EMP	57	7	64	17	44	62	640
155	TOTAL		162	318	481	322	249	571	5802
156	6. Single-Family Res.	416.00 DU	83	250	333	250	166	416	4160
156	7. Multi-Family Res.	423.00 DU	86	214	300	171	128	300	3424
156	17. Retail Employment	326.00 EMP	196	46	241	166	241	408	4711
156	18. Total Employment	2700.00 EMP	621	81	702	189	486	675	7020
156	TOTAL		985	590	1576	776	1022	1798	19315
157	6. Single-Family Res.	416.00 DU	83	250	333	250	166	416	4160
157	7. Multi-Family Res.	428.00 DU	86	214	300	171	128	300	3424
157	17. Retail Employment	326.00 EMP	196	46	241	166	241	408	4711
157	18. Total Employment	2700.00 EMP	621	81	702	189	486	675	7020
157	TOTAL		985	590	1576	776	1022	1798	19315
158	6. Single-Family Res.	1206.00 DU	241	724	965	724	482	1206	12060
158	7. Multi-Family Res.	357.00 DU	71	179	250	143	107	250	2856
158	17. Retail Employment	265.00 EMP	159	37	196	135	196	331	3829
158	18. Total Employment	1500.00 EMP	345	45	390	105	270	375	3900
158	TOTAL		817	984	1801	1107	1056	2162	22645
159	6. Single-Family Res.	486.00 DU	97	292	389	292	194	486	4860
159	7. Multi-Family Res.	1022.00 DU	204	511	715	409	307	715	8176
159	17. Retail Employment	1930.00 EMP	1158	270	1428	984	1428	2413	27889
159	18. Total Employment	7251.00 EMP	1668	218	1885	508	1305	1813	18853
159	TOTAL		3127	1290	4418	2192	3234	5427	59777
160	6. Single-Family Res.	2673.00 DU	535	1604	2138	1604	1069	2673	26730
160	7. Multi-Family Res.	728.00 DU	146	364	510	291	218	510	5824
160	17. Retail Employment	1625.00 EMP	975	228	1203	829	1203	2031	23481
160	18. Total Employment	2971.00 EMP	683	89	772	208	535	743	7725
160	TOTAL		2339	2284	4623	2932	3025	5957	63760
161	6. Single-Family Res.	111.00 DU	22	67	89	67	44	111	1110
161	7. Multi-Family Res.	331.00 DU	66	166	232	132	99	232	2648
161	8. Hillside Res. (EO)	110.00 DU	22	88	110	88	44	132	1320
161	9. General Commercial	210.20 TSF	189	168	357	610	652	1261	14714
161	11. Office	1345.30 TSF	2556	404	2960	807	2287	3094	17489
161	15. R&D	2197.40 TSF	1978	220	2197	659	2417	3076	22633
161	28. Park	8.00 ACRE	2	0	2	2	2	3	40
161	31. Maintenance Yard	6.50 ACRE	0	0	0	0	0	0	130
161	TOTAL		4835	1112	5947	2365	5545	7910	60084
162	6. Single-Family Res.	84.00 DU	17	50	67	50	34	84	840
162	8. Hillside Res. (EO)	615.00 DU	123	492	615	492	246	738	7380
162	9. General Commercial	178.60 TSF	161	143	304	518	554	1072	12502
162	11. Office	938.90 TSF	1784	282	2066	563	1596	2159	12206
162	15. R&D	1533.60 TSF	1380	153	1534	460	1687	2147	15796
162	22. Fire Station	1.00 ACRE	0	0	0	0	0	0	20
162	24. Elementary School	600.00 STU	102	54	156	60	84	144	618

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
162	26. High School	2000.00 STU	440	140	580	260	220	480	2780
162	28. Park	8.00 ACRE	2	0	2	2	2	3	40
162	TOTAL		4008	1314	5323	2405	4422	6827	52132
163	8. Hillside Res. (EO)	1078.00 DU	216	862	1078	862	431	1294	12936
163	24. Elementary School	600.00 STU	102	54	156	60	84	144	618
163	28. Park	16.00 ACRE	3	0	3	3	3	6	80
163	TOTAL		321	916	1237	926	518	1444	13634
164	8. Hillside Res. (EO)	235.00 DU	47	188	235	188	94	282	2820
164	28. Park	20.00 ACRE	4	0	4	4	4	8	100
164	TOTAL		51	188	239	192	98	290	2920
165	6. Single-Family Res.	1987.00 DU	397	1192	1590	1192	795	1987	19870
165	TOTAL		397	1192	1590	1192	795	1987	19870
166	6. Single-Family Res.	1506.00 DU	301	904	1205	904	602	1506	15060
166	TOTAL		301	904	1205	904	602	1506	15060
167	6. Single-Family Res.	165.00 DU	33	99	132	99	66	165	1650
167	TOTAL		33	99	132	99	66	165	1650
168	6. Single-Family Res.	236.00 DU	47	142	189	142	94	236	2360
168	TOTAL		47	142	189	142	94	236	2360
169	6. Single-Family Res.	2859.00 DU	572	1715	2287	1715	1144	2859	28590
169	17. Retail Employment	880.00 EMP	528	123	651	449	651	1100	12716
169	18. Total Employment	912.00 EMP	210	27	237	64	164	228	2371
169	TOTAL		1310	1866	3176	2228	1959	4187	43677
170	6. Single-Family Res.	847.00 DU	169	508	678	508	339	847	8470
170	TOTAL		169	508	678	508	339	847	8470
171	6. Single-Family Res.	933.00 DU	187	560	746	560	373	933	9330
171	TOTAL		187	560	746	560	373	933	9330
172	6. Single-Family Res.	3116.00 DU	623	1870	2493	1870	1246	3116	31160
172	7. Multi-Family Res.	1947.00 DU	389	974	1363	779	584	1363	15576
172	17. Retail Employment	654.00 EMP	392	92	484	334	484	818	9450
172	18. Total Employment	705.00 EMP	162	21	183	49	127	176	1833
172	TOTAL		1567	2956	4523	3031	2441	5473	58019
173	6. Single-Family Res.	2484.00 DU	497	1490	1987	1490	994	2484	24840
173	18. Total Employment	32.00 EMP	7	1	8	2	6	8	83
173	TOTAL		504	1491	1996	1493	999	2492	24923
174	6. Single-Family Res.	607.00 DU	121	364	486	364	243	607	6070
174	7. Multi-Family Res.	1697.00 DU	339	849	1188	679	509	1188	13576
174	17. Retail Employment	64.00 EMP	38	9	47	33	47	80	925
174	18. Total Employment	64.00 EMP	15	2	17	4	12	16	166
174	TOTAL		514	1224	1738	1080	811	1891	20737

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ACT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
175	6. Single-Family Res.	3.00 DU	1	2	2	2	1	3	30
175	TOTAL		1	2	2	2	1	3	30
176	6. Single-Family Res.	3.00 DU	1	2	2	2	1	3	30
176	TOTAL		1	2	2	2	1	3	30
177	6. Single-Family Res.	34.00 DU	7	20	27	20	14	34	340
177	TOTAL		7	20	27	20	14	34	340
178	6. Single-Family Res.	1439.00 DU	288	863	1151	863	576	1439	14390
178	7. Multi-Family Res.	608.00 DU	122	304	426	243	182	426	4864
178	17. Retail Employment	1216.00 EMP	730	170	900	620	900	1520	17571
178	18. Total Employment	1341.00 EMP	308	40	349	94	241	335	3487
178	TOTAL		1447	1378	2825	1821	1899	3720	40312
179	7. Multi-Family Res.	2861.00 DU	572	1431	2003	1144	858	2003	22888
179	17. Retail Employment	2741.00 EMP	1645	384	2028	1398	2028	3426	39607
179	18. Total Employment	3076.00 EMP	707	92	800	215	554	769	7998
179	TOTAL		2924	1907	4831	2758	3440	6198	70493
180	6. Single-Family Res.	1940.00 DU	388	1164	1552	1164	776	1940	19400
180	7. Multi-Family Res.	800.00 DU	160	400	560	320	240	560	6400
180	TOTAL		548	1564	2112	1484	1016	2500	25800
181	6. Single-Family Res.	1912.00 DU	382	1147	1530	1147	765	1912	19120
181	7. Multi-Family Res.	405.00 DU	81	203	284	162	122	284	3240
181	17. Retail Employment	117.00 EMP	70	16	87	60	87	146	1691
181	18. Total Employment	213.00 EMP	49	6	55	15	38	53	554
181	TOTAL		583	1372	1955	1384	1011	2395	24604
182	6. Single-Family Res.	2725.00 DU	545	1635	2180	1635	1090	2725	27250
182	7. Multi-Family Res.	867.00 DU	173	434	607	347	260	607	6936
182	17. Retail Employment	2122.00 EMP	1273	297	1570	1082	1570	2653	30663
182	18. Total Employment	2247.00 EMP	517	67	584	157	404	562	5842
182	TOTAL		2508	2433	4941	3221	3325	6546	70691
183	18. Total Employment	8110.00 EMP	1865	243	2109	568	1460	2028	21086
183	TOTAL		1865	243	2109	568	1460	2028	21086
184	6. Single-Family Res.	66.00 DU	13	40	53	40	26	66	660
184	7. Multi-Family Res.	524.00 DU	105	262	367	210	157	367	4192
184	17. Retail Employment	8.00 EMP	5	1	6	4	6	10	116
184	18. Total Employment	98.00 EMP	23	3	25	7	18	25	255
184	TOTAL		145	306	451	260	207	467	5222
185	6. Single-Family Res.	375.00 DU	75	225	300	225	150	375	3750
185	7. Multi-Family Res.	2972.00 DU	594	1486	2080	1189	892	2080	23776
185	17. Retail Employment	44.00 EMP	26	6	33	22	33	55	636
185	18. Total Employment	555.00 EMP	128	17	144	39	100	139	1443
185	TOTAL		823	1734	2557	1475	1174	2649	29605
186	6. Single-Family Res.	899.00 DU	180	539	719	539	360	899	8990

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION

ZONE	USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
			IN	OUT	TOTAL	IN	OUT	TOTAL	
186	7. Multi-Family Res.	2189.00 DU	438	1095	1532	876	657	1532	17512
186	17. Retail Employment	620.00 EMP	372	87	459	316	459	775	8959
186	18. Total Employment	2303.00 EMP	530	69	599	161	415	576	5988
186	TOTAL		1519	1790	3309	1892	1890	3782	41449
187	6. Single-Family Res.	1089.00 DU	218	653	871	653	436	1089	10390
187	7. Multi-Family Res.	1061.00 DU	212	531	743	424	318	743	9488
187	17. Retail Employment	332.00 EMP	199	46	246	169	246	415	4797
187	18. Total Employment	1305.00 EMP	300	39	339	91	235	326	3393
187	TOTAL		929	1270	2199	1338	1234	2573	27568
188	6. Single-Family Res.	105.00 DU	21	63	84	63	42	105	1050
188	7. Multi-Family Res.	368.00 DU	74	184	258	147	110	258	2944
188	17. Retail Employment	516.00 EMP	310	72	382	263	382	645	7456
188	18. Total Employment	4588.00 EMP	1055	138	1193	321	826	1147	11929
188	TOTAL		1459	457	1916	795	1360	2155	23379

ORANGE CIRCULATION STUDY TRAFFIC MODEL - POST-2010 LAND USE AND TRIP GENERATION SUMMARY

USE	UNITS	-----AM PK HR-----			-----PM PK HR-----			ADT
		IN	OUT	TOTAL	IN	OUT	TOTAL	
1. Res - Low	31207.00 DU	6241	18724	24966	18724	12483	31207	31207
2. Res - Medium	13363.00 DU	7216	2405	9621	7216	5746	12962	114922
3. Res - Med-High	12866.00 DU	5790	1930	7720	5790	4632	10421	91349
4. Res - High/Apt.	0.00 DU	0	0	0	0	0	0	0
5. Mobile Home	0.00 DU	0	0	0	0	0	0	0
6. Single-Family Res.	59365.00 DU	11873	35619	47492	35619	23746	59365	593650
7. Multi-Family Res.	41548.00 DU	8310	20774	29084	16619	12464	29084	332384
8. Hillside Res. (EO)	6888.00 DU	1378	5510	6888	5510	2755	8266	82656
9. General Commercial	10303.38 TSF	9273	8243	17516	29880	31940	61820	721237
10. Regional Commerical	628.30 TSF	251	126	377	880	942	1822	21991
11. Office	32100.07 TSF	60990	9630	70620	19260	54570	73830	417301
12. Medical Office	63.24 TSF	58	46	103	62	168	230	2161
13. Industrial	16227.46 TSF	13631	1947	15578	1947	14767	16714	113105
14. Industrial Park	0.00 TSF	0	0	0	0	0	0	0
15. R&D	5001.00 TSF	4501	500	5001	1500	5501	7001	51510
16. Hotel	910.00 ROOM	455	273	728	364	364	728	10920
17. Retail Employment	25382.00 EMP	15229	3553	18783	12945	18783	31728	366770
18. Total Employment	99300.00 EMP	22839	2979	25818	6951	17874	24825	258180
19. Hospital	1395.00 BED	1074	419	1493	642	1060	1702	16391
20. Church	0.00 TSF	0	0	0	0	0	0	0
21. Library	162.22 TSF	251	253	505	532	474	1006	7381
22. Fire Station	21.60 ACRE	0	0	0	0	0	0	432
23. Cemetary	47.00 ACRE	0	0	0	0	0	0	196
24. Elementary School	20385.00 STU	3465	1835	5300	2039	2854	4892	20997
25. Junior High School	9206.00 STU	1565	829	2394	921	1289	2209	9482
26. High School	9865.00 STU	2170	691	2861	1282	1085	2368	13712
27. Com. Recreation	84.10 ACRE	0	0	0	0	0	0	3364
28. Park	676.50 ACRE	135	0	135	135	135	271	3383
29. County Facil. (SG)	650.00 UNIT	364	104	468	65	546	611	6500
30. Golf Course	355.00 ACRE	0	0	0	0	0	0	2130
31. Maintenance Yard	6.50 ACRE	0	0	0	0	0	0	130
32. College	10080.00 STU	1512	302	1814	403	806	1210	15624
33. Government Office	93.00 TSF	459	87	547	759	267	1026	6410
34. Specialty Comm.	579.00 TSF	232	116	347	811	869	1679	20265
35. Anaheim Stadium-SG	124.60 ACRE	0	0	0	0	0	0	0
GRAND TOTAL		179263	116895	296158	170856	216120	386976	3616602

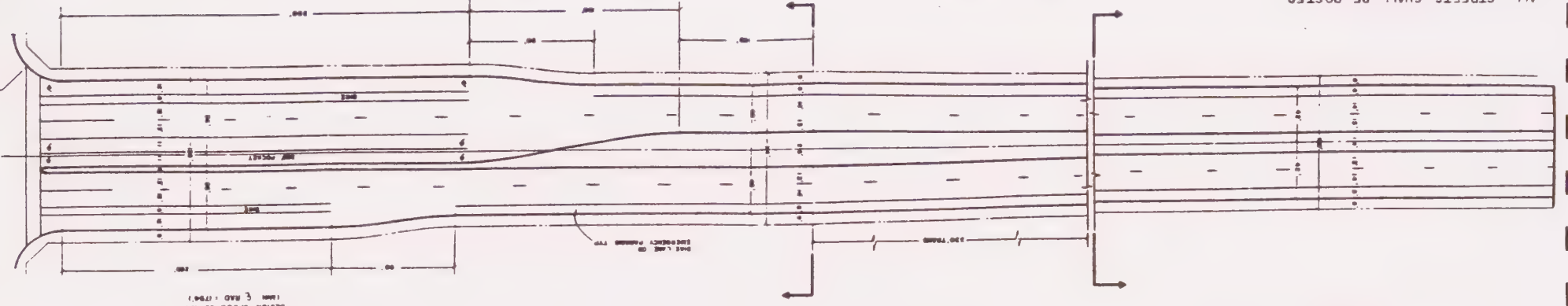
APPENDIX B

ENHANCED INTERSECTION MODIFICATIONS

Figure B-1 shows design examples of major and primary enhanced intersections and Figure B-2 gives examples of secondary enhanced intersections with single and dual left-turn pockets. Each example shows the right-of-way required at the intersection together with the standard arterial section right-of-way.

Figure B-1

ALL STREETS SHALL BE POSTED
NO PARKING

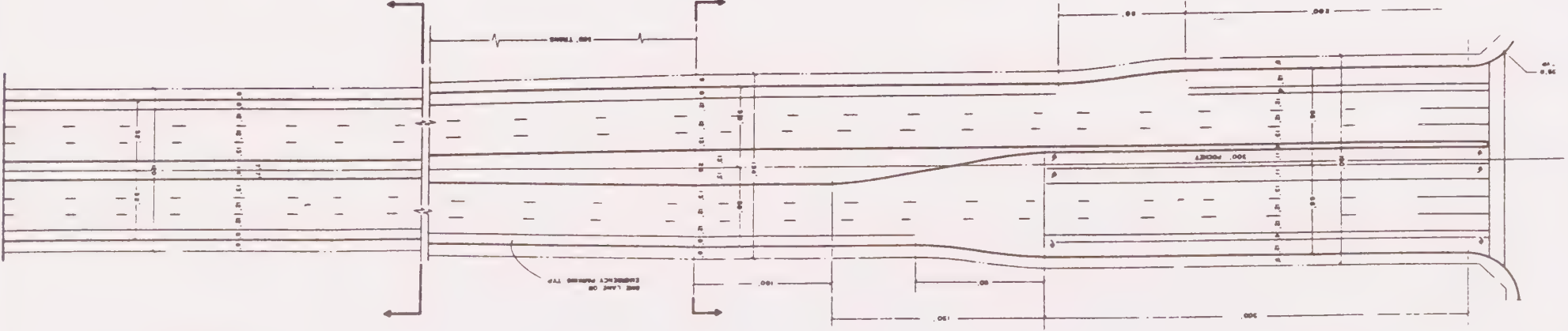


PRIMARY STREET SECTION

DESIGN SPEED 35 MPH
MIN. C. ROAD = 1754'

PRIMARY ENHANCED
INTERSECTION

DESIGN SPEED 35 MPH
MIN. C. ROAD = 1754'



MAJOR ENHANCED
INTERSECTION

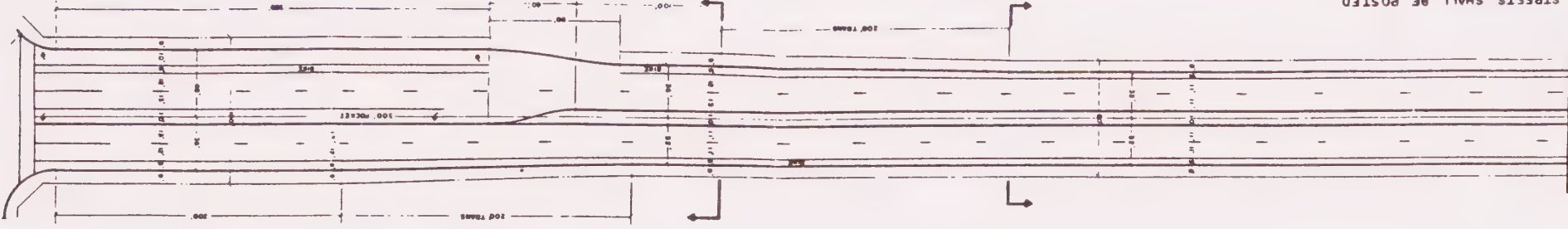
DESIGN SPEED 60 MPH
MIN. C. ROAD = 2345'

MAJOR STREET SECTION

DESIGN SPEED 60 MPH
MIN. C. ROAD = 2345'

Figure B-2

ALL STREETS SHALL BE POSTED
NO PARKING

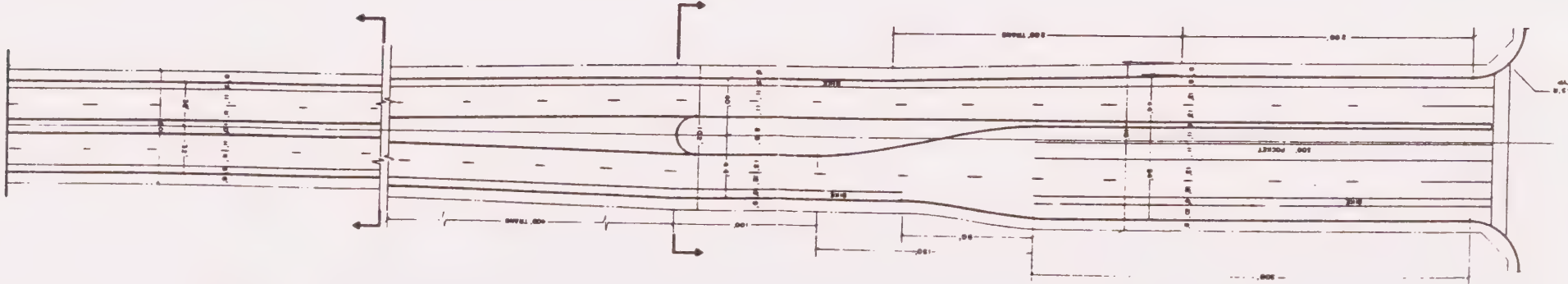


DESIGN SPEED 50 MPH
(MIN 35 MAX 150)

**SECTION
SECONDARY STREET**

DESIGN SPEED 50 MPH
(MIN 35 MAX 150)

**SECTION
SECONDARY ENHANCED
INTERSECTION**



DESIGN SPEED 50 MPH
(MIN 35 MAX 150)

(OFFSETTING PRIMARY ENHANCED INTERSECTION)

**SECTION
SECONDARY ENHANCED
INTERSECTION**

(SPECIAL)

DESIGN SPEED 50 MPH
(MIN 35 MAX 150)

**SECTION
SECONDARY STREET**

Housing Element Technical Report



HOUSING ELEMENT
TECHNICAL REPORT

City of Orange
General Plan Update

November, 1987

Cotton/Beland/Associates, Inc.
1028 North Lake Avenue, Suite 107
Pasadena, California 91104

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1.0 INTRODUCTION

This Technical Report provides an overview of the demographic, socio-economic and housing characteristics of the City of Orange. Most of the information contained in this section must be considered prior to the development and implementation of housing programs identified in the Housing Element.

The primary sources of information used in this Technical Report came from data obtained from past United States censuses. In addition, the California State Department of Finance provides annual population and housing estimates for all jurisdictions in the State. These current estimates were used to update statistics obtained in the most recent 1980 U.S. census.

2.0 EXISTING POPULATION CHARACTERISTICS

Population The City's population as of January 1, 1987 was estimated by the State Department of Finance to be 103,300 persons. The population, according to the 1980 Census, was 91,788 persons. This represents an increase of approximately 19 percent over the 1970 population of 77,374 persons.

The City of Orange, along with much of Orange County, experienced tremendous population growth during the period between 1950 and 1970. This growth was due to the widespread availability of land and subsequent development of large residential tracts. In addition, convenient automobile access provided by the growing freeway system encouraged people to move from inner-city areas to suburban Orange County. A growing industrial base also contributed to the overall population growth as a substantial number of new jobs were generated. These and other factors led to an increase in the City's population from 10,027 in 1950 to an estimated 103,300 persons in 1987.

With the dramatic increase in the cost of land as well as a limited amount of usable vacant land on which to develop, it is doubtful that such unprecedented growth will ever occur in the older portions of the City. On the other hand, 20,000 acres of the Irvine Ranch is within the City's sphere of influence and is generally undeveloped. Plans currently under preparation propose large tracts to be developed in both residential and commercial land uses by the year 2000.

TABLE H-1
POPULATION TRENDS IN ORANGE: 1950-1987

Year	Population	Net Increase	% Change	Annual Growth Rate
1950	10,027			
1960	26,444	16,417	164%	16.4%
1970	77,374	50,930	193%	19.3%
1980	92,788	15,414	20%	2.0%
1987	103,300	10,512	11%	1.6%

Source: U.S. Census 1950, 1960, 1970, 1980
Department of Finance, 1987

Age-Sex The distribution and change in the population by age group is an important factor in determining both the composition of the general population projecting future population, which in turn affects future housing needs. The age-sex pyramid included in Figure H-1 illustrates the balance in population by gender and age for 1970 and 1980 in graphic form. Several demographic trends become evident when comparing the 1970 and 1980 statistics.

The proportionate number of school-age children (ages 5 to 18) to total population decreased during this period. In 1970, children between the ages of 5 and 18 accounted for 30.6 percent of Orange's population. In contrast, the 1980 Census showed only 23.5 percent of the City's population in this group.

Similarly, the the proportion of pre-school age children (under 5) to total population has decreased. In 1970, this group accounted for 7.4 percent of the population, whereas the 1980 Census shows that they made up 6.4 percent of the Orange residents.

On the other hand, the proportionate number of female residents who are in their prime child-bearing ages (18 to 39) to total population increased from 16.8 percent in 1970 to 19.2 percent in 1980.

The demographic trends that emerged at the close of the decade between 1970 and 1980 largely reflected statewide and national trends. During this period, couples delayed having children, resulting in a significant decline in the natural population increase. This trend was attributed to the growing number of married women who were returning to the workforce for economic and other reasons. In the 1980s, this trend reversed, much to the surprise of many demographers. Current statistics indicate that many of those women who delayed having children in the 1970s are now having children, resulting in a "baby boom" among the baby boomers (persons born after the Second World War up to the end of the 1950s).

School enrollment figures obtained from the Orange Unified School District illustrate how and to what extent this population trend has affected the City. Enrollments gradually increased in the first half of the 1970s and reached a peak around 1976. After 1976, enrollments experienced a sharp decline until the mid-1980s. After 1985, the second wave of children born at the end of the 1970s and early 1980s began entering schools. Of the 25 elementary schools in the Orange Unified School District, 17 had enrollments that exceeded their rated capacity in

the 1985-86 school year. During this same period, all seven of the district's junior high schools and all four of the senior high schools had enrollments that fell below their rated capacity. Over time, as the younger children presently enrolled in the elementary schools move up in the grade levels, the junior and senior high schools will be impacted as well.

In 1970, senior citizens (age 60 and above) comprised 8.9% of the City's population and numbered 6,921. By 1980, seniors accounted for 11.2 percent of the City's population. As related to housing, this increase also suggests that a number of long-time residents are comfortable residing in Orange. This may be due to the fact that relocating may be too expensive and inconvenient. Senior citizens' housing needs, by nature, differ from other age groups of the community and represent a special needs group in terms of housing and related services. Overall, the median age increased from 25.4 in 1970 to 29.2 in 1980. When the 1990 Census has been completed, it may become evident that the median age has once again declined, reflecting the recent increases in young children.

Ethnicity The ethnic characteristics of the City in 1970 and 1980 are summarized below in Table H-2. The statistics included in Table 2 were derived from census data obtained from the 1970 and 1980 Censuses. Whites accounted for the greatest majority of the City's population in both 1970 and 1980. In 1970, nonwhites accounted for approximately 2 percent of the City's population, while by 1980, nonwhites comprised over 10 percent of the City's population. Most of the nonwhites in Orange resided in a single tract (762.04) bounded on the south by Walnut Avenue, on the north by Taft Avenue, on the east by Glassell Street, and on the west by the Santa Ana River. Approximately 35 percent of the population residing in this tract were classified as nonwhite according to the 1980 Census.

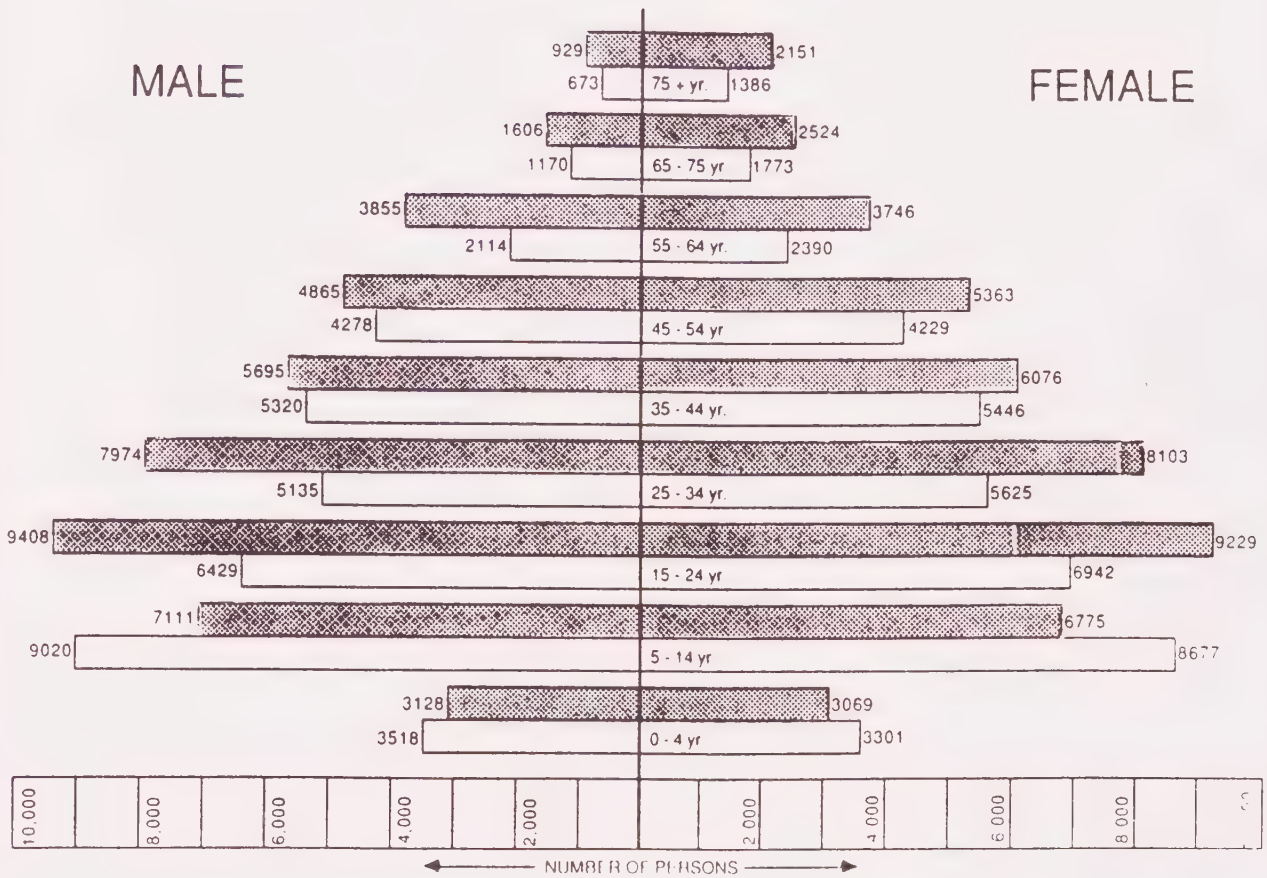
TABLE H-2
ETHNICITY OF POPULATION: 1970-1980

Category	Total Population	% of Total	Total Population	% of Total
	75,849	98.0	81,903	89.2
Black	213	0.3	865	1.0
Indian	N/A	N/A	652	0.7
Asian	N/A	N/A	3,197	3.5
Other	1,312	1.7	5,171	5.6
(Spanish)	(8,700)	(11.2)	(11,372)	(12.4)
TOTAL	77,374	100.0%	91,788	100.0%

Source: U.S. Census, 1970 and 1980 Reports

MALE

FEMALE



1980 Census



1970 Census



city of
orange
general plan program

Figure H-1
Age-Sex Pyramid

3.0 SOCIO-ECONOMIC CHARACTERISTICS

The household is the basic economic unit used by planners, administrators, and economists to identify housing needs in a community. A household is defined as a group of related or unrelated persons living together. According to 1986 estimates provided by the State Department of Finance, there were 36,029 households in the City in 1986. Census statistics indicate there were 22,986 households in 1970 and 31,708 households in 1980.

The average household size decreased from a high of 3.37 in 1970 to a low of 2.93 in 1980. Since 1980 there has been a trend towards larger households, resulting in a corresponding increase in the average household size. According to Department of Finance estimates, the average household size for the City in 1986 was 3.08 persons. This increase in the average household size (from 1980 to 1986) is a reflection of the increased number of families with small children now residing in the City.

Household Income According to the 1980 U.S. Census, the 1980 median household income in Orange was \$22,100 compared to the median income of \$22,802 for the Santa Ana/Garden Grove Standard Metropolitan Statistical Area. The household income characteristics for the City is summarized in Table H-3.

TABLE H-3
HOUSEHOLD INCOME - 1979

Income Category	Number of Households	Percent
Less than \$5,000	2,439	7.7%
\$5,000-7,499	1,630	5.1
\$7,500-9,999	1,644	5.2
\$10,000-14,999	4,466	14.1
\$15,000-19,999	3,760	11.8
\$20,000-24,999	4,065	12.8
\$25,000-34,999	6,499	20.5
\$35,000-47,999	4,652	14.7
\$50,000 or more	<u>2,574</u>	<u>8.1</u>
TOTAL	31,749	100.0%

Source: 1980 U.S. Census

In order to compare income with housing needs, income categories need to be established. These categories are traditionally classified as: very low income (less than 50 percent of median income); low income (50 to 80 percent of median income); moderate (80 to 120 percent of median income); and upper income (above 120 percent of median income). According to the 1980 Census, 16.9 percent of the households in the City were classified as having very low incomes, 22.5 percent were in the low income category, 22.2 percent were moderate income, and the remaining 38.3 percent were in the upper income category.

Overcrowding According to State and Federal guidelines, overcrowding is defined as a household which has more than 1.01 persons per room. Bathrooms, porches, halls, balconies, foyers and half rooms are not counted when determining the ratio of persons to rooms.

The U. S. Census reported that approximately 4.5 percent of the City's households were overcrowded in 1980. Of those households that were identified as being overcrowded, 68 percent were renter-occupied and 32 percent were owner-occupied. These figures indicate that future code enforcement efforts may need to focus on problems related to overcrowding. Severe overcrowding is indicative of a shortage of affordable housing within a community or neighborhood. In addition, a housing unit that is overcrowded will often experience increased rates of deterioration.

**TABLE H-4
1980 STATISTICS ON OVERCROWDING**

	Owner Occupied	Renter Occupied	Total Occupied
<u>Occupied Units:</u>			
Number	18,854	12,854	31,708
% of Total	59.56%	40.54%	100%
<u>Overcrowded Units</u>			
Number	453	974	1,427
% of Total	1.43%	3.07%	4.5%

Source: 1980 U.S. Census

Housing Costs According to the 1980 Census, the median value of an owner-occupied home in the City (excluding condominiums) was \$99,900. This compares to the median home value in Orange County of \$108,000. The 1980 Census categorized owner-occupied housing into the ranges provided in Table H-5.

**TABLE H-5
VALUE OF OWNER-OCCUPIED UNITS
(Excluding Condominiums)**

Value	Number of Units	Percent
\$19,999 or less	64	.41%
\$20,000 - \$34,999	132	.85
\$35,000 - \$49,999	232	1.49
\$50,000 - \$79,999	2,501	16.08
\$80,000 - \$99,999	4,867	31.28
\$100,000 - \$149,999	5,656	36.35
\$150,000 - \$199,999	1,388	8.92
\$200,000 - or more	718	4.61
TOTAL	15,558	99.99%

Source: 1980 U.S. Census

The 1980 Census also reported that the median rental rate in the City of Orange was \$317, as compared to a county average of \$336. Table H-6 indicates the number of units available in 1980 at the various rental rates.

**TABLE H-6
RENTAL RATES**

Rental Rate	Number of Units	Percent
\$50 or less	17	.14%
\$50 - 99	189	1.51
\$100 - 149	401	3.22
\$150 - 199	828	6.64
\$200 - 299	4,041	32.40
\$300 - 399	4,533	36.35
\$400 - 499	1,532	12.28
\$500 or more	930	7.46
TOTAL	12,471	100.00%

Source: 1980 U.S. Census

Overpayment for Housing

Affordability of housing is determined by comparing values of owner-occupied units and rental rates to income distribution and reviewing the number of households that pay more than 30 percent of their gross income for housing costs.

A household, regardless of how low its income, is not considered to need housing assistance unless it is paying more than it can afford for housing. The Federal Department of Housing and Urban Development (HUD) has determined that households paying in excess of 30 percent of their gross monthly incomes for housing may be eligible for some form of housing assistance. This is especially true for lower income households. Approximately 17.2 percent of the households in the City were paying more than 30 percent of their gross monthly income for housing in 1980. Approximately 41.3 percent of the City's low income households were paying in excess of 30 percent of their monthly income for housing. Table H-7 reveals, not surprisingly, that the lower income groups are more likely to be affected by housing costs than the more affluent income groups. Over half of those households earning less than \$10,000 per year are paying in excess of 30 percent of their annual incomes for housing. This is compared to those households which earn \$25,000 per year. Only one-tenth of one percent of this income group paid 30 percent or more of their annual income for housing.

TABLE H-7
HOUSEHOLDS PAYING MORE THAN
30% OF INCOME FOR HOUSING - 1980

Household Income	Number Paying Over 30%	Total Households	% of Total Households ¹
Less than \$10,000	2,895	5,733	50.5
\$10,000 - 14,999	1,789	4,466	40.1
\$15,000 - 19,999	551	3,760	14.7
\$20,000 - 24,999	190	4,065	4.7
\$25,000 and over	22	13,725	0.1
TOTAL	5,447	31,749	17.2%
(1) Percents refer to percentage of each income category paying in excess of 30% of the household income for housing.			

Source: 1980 U.S. Census

Examination of Table H-8 indicates that in 1980 there were limited opportunities for home ownership among the low and moderate income groups. There was an adequate supply of new housing for the higher income groups (120 percent of regional median income), which is consistent with countywide trends. The cost of home ownership in Southern California is considerably higher when compared to the national average, while the costs for housing in Orange County are even greater than that for the surrounding region.

TABLE H-8
HOUSING AFFORDABILITY - 1980***

Household Income	Number in Range**		Number of Ownership Units Available	Number of Renter Units Available	Total
Very low	19%	(6,032)	104	4,506	4,610
Low	19%	(6,032)	146	6,146	6,292
Moderate	22%	(6,985)	845	1,819	17,127
Above moderate	40%	(12,700)	14,463		
TOTAL		31,749	15,558	12,471+	28,029+
** Based on 15% interest rate for 30 years with 10% down payment					
*** Affordability is defined at 30% of monthly income devoted to housing costs					
+ Certain housing types have been omitted from these computations (e.g., condominiums, mobile homes)					

Source: 1980 U.S. Census

Special Needs Groups

The housing needs of the elderly, handicapped, large families, and female heads of household have been specifically evaluated since these groups represent those especially impacted by the availability of affordable housing. In addition, Section 65583(a)(6) of the California Government Code requires an evaluation of the housing needs of the homeless.

Elderly: The 1980 Census shows that 10,285 seniors (60 years and older) resided in the City of Orange. In addition, 22.4 percent of the households in Orange include an elderly person, representing 7,093 households. Between 1970 and 1980, the senior citizen population increased by 48.6 percent, and every indication is that the need for housing for the elderly will continue to increase in the future as the general population grows older. A review of the City's Housing Assistance Plan reveals that 997 elderly households are in need of rental assistance because these elderly households pay over 30 percent of their income for rent.

Handicapped: Though an accurate estimate of the number of households in the City which contains a disabled person is difficult to ascertain due to a lack of direct data, the City's Housing Assistance Plan indicates there were an estimated 88 lower-income households in Orange that included handicapped individuals.

The needs of the disabled are not exclusively related to affordability of housing. Other consideration includes the availability of housing designed and equipped to accommodate the disabled (i.e., wheelchair ramps, widened door widths, grab bars, etc.).

Large Families: The City's Housing Assistance Plan identified 486 households which consisted of 5 or more family members and are in need of assistance in paying the costs for housing (i.e., they are paying more than 30 percent of their income for rent). This household group constitutes 1.5 percent of total households in the City. Households in this category typically are in need of larger units, usually consisting of three or more bedrooms.

Female Heads of Household: The 1980 Census indicated that 4,455 female-headed households existed in Orange at that time. Female-headed households accounted for 14 percent of all households in the City in 1980. This figure also includes single-person households in addition to those households with children present.

Farm Workers: The SCAG Regional Housing Allocation Model estimates that 75 farm worker households exist in Orange, of which 67 are considered low or very low income.

**The
Homeless**

An accurate estimate of homeless persons in the City is difficult due to the general lack of available data. In early 1985, the Orange County Coalition for the Homeless, a group of non-profit organizations, public agencies, and concerned citizens, conducted a study to determine the gap between homeless persons in need of assistance and those who received it. Although 15 service agencies were included in the countywide evaluation, only one of those agencies were actually located in the City of Orange.

Based upon 202 interviews conducted for the study, the following profile of the homeless Orange County population emerged. For purposes of this Housing Element Technical Report, it is assumed that the characteristics of the homeless in the City of Orange do not vary significantly from those of the County in general.

"Of the persons interviewed, there were more married females than males. More women than men were widowed and separated. The majority of respondents were white, with the male population including the most blacks and the female population having the largest Hispanic representation. An almost equal number of males and females had completed high school, but the men who had completed at least some college work outnumbered the women by about 2 to 1. There were very few gender differences in age, with 82 percent of the respondents being between the ages of 20 and 40. Of those reporting reasons for losing jobs, 3.5 percent reported drug or alcohol problems and 1.5 percent reported psychiatric problems. There may have been some reticence in answering this particular question, since 33.0 percent revealed in subsequent questions that they had been seen by a doctor or counselor because of difficulties in managing their lives.

"More females (71 percent) than males (35 percent) had children under 18, with most of the children living in Orange County. The majority of children live with the parent interviewed, with a minority living with the other parent.

"Of those interviewed, 14.4 percent reported they had lived in Orange County all of their lives, and 66.5 percent lived in Orange County one year or more. The median number of years lived in the County was 10.

"Respondents stated that they came to Orange County looking for work (32.7 percent), looking for welfare benefits (1 percent), had a job in Orange County (7.9 percent), had family here or were driven to move here by family problems (14.4 percent).

"When asked how much money they received each month, the greatest number (31.2 percent), said they received no money. Of those reporting income, 24.6 percent were on either AFDC or General Relief. Of those who stated they applied for relief, 37.9 percent said they did not fill out a written application; therefore, they received no aid. Of those who were turned down after filling out an application, 46 percent reported they were denied for lack of an address, lack of proof of 30 days residence, or no identification.

"When asked why they felt they didn't have housing, 69 percent said there was no housing they could afford. Over 50 percent of the respondents stated they had been without permanent housing for some time.

"Of those interviewed, 85 percent said they were sometimes or frequently hungry, and that when they did eat, it was in shelters, a mission, a soup kitchen or food pantry. Five percent said they obtained food from garbage or trash cans.

"Health questions revealed that 35 percent of the respondents reported themselves as being in good health, 36 percent reported chronic or recurring illness, and 61 percent said they had been treated within the last year for that illness. However, 60 percent had had a serious illness while homeless, yet almost 60 percent have had no insurance.

"During the last six months, over half of the respondents had been assaulted, robbed or raped."

The study found that the service gap between shelter required for the homeless and that provided was reflected by the need for 96,503 bed-nights at the facilities evaluated versus the ability to provide only 11,530 nightly beds (for the month of May, 1985). Utilizing these proportions, only about 12 percent of the need is being addressed.

In order to translate these figures to the City of Orange, it is noted that the study included the Christian Temporary Housing facility in Orange. Statistics which were

submitted to the City which assist the homeless on a more informal basis and statistical data are not available for these efforts.

Because of the transitory nature of the target population, a meaningful solution to the problem can only be provided on a more regional scale, and emphasis should be placed at encouraging recognition of the problem and action at that level. Table H-9 identifies those facilities presently providing emergency assistance to persons in need in Orange County and the City.

**TABLE H-9
EMERGENCY SHELTERS SERVING THE PLANNING AREA**

Shelter	Address	Capacity	Description
Turning Point	12922 Seventh St. Garden Grove		Runaway and homeless youth counseling
Western Youth Services	204 East Amerige Ave. Fullerton		Runaway and homeless youth counseling
Dayle McIntosh Center for the Disabled	8100 Garden Grove Bl. Garden Grove	6	Shelter for disabled single adults
Women's Transitional Living Center	P. O. Box 6103 Orange	45	Shelter for battered women and children
Christian Outreach Mission	1901 W. Walnut Santa Ana	48	Shelter for single adults and women with children
Christian Temporary Housing Facility	704 N. Glassell St. Orange	20	Families with children who work

Source: California Homeless Shelter Provider Directory, 1987
California Homeless Coalition

4.0 HOUSING CHARACTERISTICS

Housing Types According to estimates provided by the State Department of Finance, there were 36,029 housing units in the City in 1986. Of this total number, 23,811 units (66 percent) were classified as single-family. An estimated 4,356 units were classified as being in structures containing 2 to 4 units and 6,737 units were in structures containing 5 or more units. Finally, there were an estimated 1,125 mobile homes in the City in 1986. Department of Finance housing statistics are summarized in Table H-10.

TABLE H-10
HOUSING ESTIMATES FOR ORANGE - 1986

Housing Type	No.	%
single-family units	23,811	66.1
2-4 units	4,356	12.1
5 or more units	6,737	18.7
mobile homes	<u>1,125</u>	<u>3.1</u>
Total units	36,029	100.0
Occupied units	34,918	96.9

Source: California State Department of Finance, 1987

According to the 1980 Census, there were 32,924 total residential units in the City of Orange. The 1980 Census statistics are compared to census data obtained from the 1960 and 1970 Census in Table H-11. While single-family residential development between 1970 and 1980 continued at a moderate rate, census data indicates there was an increasing trend toward multi-family development between 1960 and 1980. Overall, the number of housing units within the City increased by over 26,651 units between 1960 and 1986. While much of this increase can be attributed to new housing constructed during this period, a substantial number of housing units were added to the City's housing inventory through annexations of previously unincorporated County areas.

TABLE H-11
HOUSING TYPES: 1960-1980

Housing Types	1960		1970		1980		Change 1970-1980	
	#	%	#	%	#	%	#	%
single-family	7,748	82.6	17,147	71.9	19,648	59.7	2,501	14.6
mobile homes	*		755	32	1,134	3.4	379	50.2
multiple-family	<u>1,630</u>	17.4	<u>5,959</u>	25	<u>12,142</u>	36.9	<u>6,183</u>	103.7
Total	9,378		23,861		32,924		9,063	27.5

Note: The 1960 Census did not distinguish between conventional single-family homes and mobile homes.

Source: 1960, 1970, 1980 U.S. Censuses

A primary factor which has evidently led to increased multiple-family development in Orange is the existence of a substantial supply of land that was designated in the General Plan and zoning ordinance for densities that exceeded the density of existing development. A study in 1981 estimated that an additional 105 acres of underutilized land (developed below the allowable provisions of the General Plan) existed within the City's boundaries. The study went on to say that if this land were developed to the densities permitted under the 1981 General Plan, a substantial number of additional multiple-family units would result. Although this underutilized residential land is dispersed throughout the City, most of the 105 acres are concentrated in the southwesterly portion of Orange.

Due to demographic, economic and development trends, additional higher density development would continue in the absence of any efforts to restrict further multiple-family development. Additional development of this nature, however, can benefit the City by permitting higher density development which generally is more affordable to lower and moderate income households. This development will have a tendency to increase the supply of newer, reasonably-priced housing for both renters and those families wishing to purchase a house.

Tenure The City of Orange, through the 1970s, had a relatively high proportion of owner-occupied units as opposed to renter-occupied units.

Census statistics for 1970 and 1980 indicate, however, that during this period there was a gradual reduction in the proportion of owner-occupied units versus renter-occupied (refer to Table H-12). This trend is a reflection of the increased number of multiple-family units constructed during this period, many of which were rental units.

TABLE H-12
HOUSING TENURE

Year	Owner-Occupied Units	Renter-Occupied Units	Total
1970	63.6%	36.4%	100%
1976	62.1%	37.9%	100%
1980	59.5%	40.5%	100%

Source: 1970, 1980 U.S. Censuses.

Vacancy Orange County's housing demand is probably unsurpassed in California and the United States. The extreme demand for housing tends to lead to low vacancy rates. According to the Controlled County Population Estimates for 1979 issued by the County of Orange, the countywide vacancy rate was 3.8 percent. The vacancy rate for the City in 1986 was 3.08 percent according to Department of Finance statistics. An average of 4.0 percent is generally desirable as it allows for a sufficient amount of mobility and choice in housing. A vacancy-rate significantly higher than 4.0 percent, especially in the Southern California region, generally indicates that large numbers of recently constructed housing units have entered the market and remain unsold.

Condominium Development In recent years, escalating costs of housing have raised concerns at many governmental levels and have resulted in the adoption of housing regulations that may have significant impact on development trends. In particular, the State Subdivision Map Act, which regulates land divisions, has been amended to be more responsive to market pressures for condominium development.

Condominium development has become an increasingly popular form of housing, providing residents an alternative to traditional single-family detached units and renter-occupied multiple-family units. This form of housing provides development incentives to developers which permit reasonably quick returns on investments. At the same time, condominiums provide housing opportunities typically designed for one-person households, younger families, and older childless couples. Property maintenance is minimized also through a Homeowners' Association and is often a factor in attracting buyers.

An outgrowth of this popularity in condominium-type developments has been that the number of condominiums both in the State and nationwide increased substantially during the 1970s. Evidence for these State and national trends in condominium conversions are included in Table H-13.

TABLE H-13
CONDOMINIUM CONVERSIONS

Year	California (Units)	United States (Units)
1973	2,401 (units)	N/A
1974	3,686	
1975	1,892	
1976	2,089	25,000 (units)
1977	4,291	45,000
1978	9,197	80,000
1979	20,000 (projected)	130,000
1980-85 (projected)	N/A	1,456,840

Source: California Department of Real Estate
Department of Housing and Urban Development

Condominium development and the conversion of apartment units to condominiums have occurred in Orange since 1973. From 1973 through 1980, 1,146 new condominiums were constructed and 874 apartment units were converted to condominiums. During this same period, 1,633 apartment units were constructed.

While the trend in condominium development (locally and statewide) suggests a sizeable market for the development of new units and conversion of existing rental units, condominium development (and conversions) should not occur at the expense of rental housing. Both condominium (owner-occupied) and rental housing satisfies the varying housing needs of differing economic segments of the community.

**Housing
Condition**

The provision of structurally sound housing is a major concern of State, regional and local housing goals. Important indicators of the condition of the existing housing supply are age and condition.

Age: The age of a structure has a significant effect on its physical condition. However, by itself, age is not a valid indicator of housing condition since proper care and maintenance will extend the physical and economic life of a unit.

With proper maintenance, a structure will begin to exhibit minor physical deficiencies approximately 20 years after construction; major physical defects will become apparent approximately 40 years after construction. Approximately 9,202 dwelling units, or 28 percent, of the City's housing stock are more than 25 years old. By the year 2000, these same units will be over 40 years old. Programs in the Housing Element will need to be focused on efforts to maintain and rehabilitate this portion of the City's housing stock.

**TABLE H-14
AGE OF RESIDENTIAL STRUCTURES - 1980**

Year Built	Number of Units	Percent of Total Units
1970-1980	9,084	27.6
1960-1969	14,638	44.5
1950-1959	5,758	17.5
1940-1949	992	3.0
Prior to 1940	2,452	7.4

Source: 1970 and 1980 U.S. Censuses

A direct relationship can be readily observed between the maintenance and the upkeep of a unit and the life expectancy of a dwelling unit. A poorly maintained housing unit can affect the value of adjacent units as well as detracting from the appearance of an entire neighborhood.

Condition: The City of Orange's adopted Housing Assistance Plan for 1982-1985 indicates that 97.32 percent of the City's housing stock is structurally sound, while 1.97 percent is substandard (does not meet Section 8 Existing

Housing Quality Standards). This substandard housing is suitable for rehabilitation in that the units are structurally sound and cost of rehabilitation will not exceed the projected market value after rehabilitation. Finally, 0.71 percent of the total housing stock were found to be dilapidated to the point where it will not be economically feasible to rehabilitate or reconstruct the units. Details summarizing housing conditions are included in Table H-15.

**TABLE H-15
CONDITION OF RESIDENTIAL STRUCTURES**

Condition	Percent	Number
a) SOUND	97.32	31,606
- Occupied Units		30,860
- Vacant Units		746
b) SUBSTANDARD BUT SUITABLE FOR REHABILITATION	1.97	641
- Occupied Units		624
- Vacant Units		17
c) DETERIORATED; NOT ECON. FEASIBLE FOR REHABILITATION	.71	228
- Occupied Units		224
- Vacant Units		4
d) TOTAL UNITS IN 1980	100.00%	32,475
- Occupied		31,708
- Vacant		767

Source: Housing Assistance Plan 1982-85.

While an overwhelming portion of the City's housing stock is in sound condition, programs need to be supported that will assist in the rehabilitation of the substandard units. Rehabilitation programs will help to prevent further deterioration of substandard units and protect the residential neighborhoods in which these units are located from the adverse economic and aesthetic effects of substandard housing.

5.0 EMPLOYMENT CHARACTERISTICS

Employment related factors strongly influence the housing market in terms of local and regional housing demand and distribution, housing costs and housing types. The residents of Orange are primarily white-collar workers, as is illustrated by the 1980 U.S. Census data, which classified 63.1 percent of the City's labor force into this category (refer to Table H-16).

TABLE H-16
TYPE OF EMPLOYMENT - 1980

Employment Category	Number	Percent
Managerial and Professional	12,895	27.6%
Technical, Sales and Administrative Support	16,630	35.5%
Service Occupations	4,923	10.5%
Farming, Forestry and Fishing	435	.9%
Precision Production, Craft, Repair	5,884	12.6%
Machine Operator, Fabricator and Laborer	6,014	12.9%
TOTAL:	46,781	100.0%

Source: 1980 Census

Similarly, employment commuting patterns have a significant impact on housing and housing choice. As transportation distance and cost increases, less disposable income remains for housing and other necessities.

Orange's commuting patterns were defined in 1976 through a part of the Special Census which asked respondents to identify employment commuting distances. The results of the survey indicated that the median one-way commuting distance for Orange workers is approximately eight miles. The detailed results from the 1976 Census are summarized in Table H-17.

TABLE H-17
ONE-WAY EMPLOYMENT COMMUTING
DISTANCES FOR HEADS OF HOUSEHOLDS - ORANGE: 1976

Commuting Distance	Number of Commuters	Percent of Total
Works at Home	906	3.3%
1-2 miles	2,349	8.6%
3-4 miles	1,982	7.2%
5-6 miles	2,143	7.8%
7-8 miles	1,629	5.9%
9-10 miles	1,798	6.5%
11-15 miles	1,985	7.2%
16-20 miles	988	3.6%
20 or more miles	3,676	13.3%
No response	<u>10,092</u>	<u>36.6%</u>
TOTAL:	27,548	100.0%

Source: 1976 U.S. Special Census

Open Space
and Conservation Element
Technical Report



OPEN SPACE AND CONSERVATION ELEMENT
TECHNICAL REPORT

City of Orange
General Plan Update

December, 1987

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1.0 INTRODUCTION

The long-term health of a community depends upon the careful and deliberate conservation and management of its resources. Through such efforts, a city may achieve present economic and environmental goals while preserving resources for future generations. The Open Space and Conservation Element Technical Report is concerned with identifying those resources which contribute to the quality of life in Orange and which therefore should receive careful consideration in the long-range planning process.

Resources in the City

Resources in Orange fall into three general categories which are discussed in separate sections of this report: 1) natural resources; 2) cultural resources; and 3) open space resources. The natural resources identified in Section 2.0 include air quality, surface water and groundwater resources (including watershed area), sand and gravel resources, soils, agricultural resources, and plant and wildlife resources.

Section 3.0 of this technical report identifies the City's cultural resources - namely, the archaeological resources in the hills and the historical buildings and places located Citywide.

Because natural resources are addressed in Section 2.0, the open space resource section focuses on recreational and passive open space. In conformance with Section 5076 of the State Public Resources Code, the open space section also addresses trail-oriented recreational use.

State Requirements

Since 1970, State general plan law has required every jurisdiction to inventory its natural and open space resources and to develop policies to ensure the protection and proper use of those identified resources. Resource management policy must be spelled out in two required general plan elements - the Conservation Element and the Open Space Element.

According to the State general plan guidelines, the Conservation Element must contain policy to guide the "conservation, development and utilization of natural resources." (Guidelines, page 115) The following issues must be addressed to the extent they apply:

- °Water and its hydraulic force;
- °Forests;
- °Rivers and other waters;
- °Harbors;
- °Fisheries;
- °Wildlife;
- °Minerals; and
- °Other natural resources.

Mineral resource issues must be discussed in some detail, as required by Sections 2762 and 2764 of the Public Resources Code. In particular, policies related to mineral resource management must recognize any resource classification designations applied by the State Department of Conservation, Division of Mines and Geology.

Additional conservation issues which may be discussed in the Conservation Element are the protection of watersheds, the regulation of land use in stream channels and even the preservation of cultural resources, such as historic buildings or archaeological sites.

To some extent, the issues which must be addressed in the Open Space Element overlap with those covered in the Conservation Element. State general plan law indicates that the Open Space Element must discuss:

- °Open space for the preservation of natural resources;
- °Open space for the managed production of resources;
- °Open space for outdoor recreation; and
- °Open space for public health and safety.

Because of the overlap, the State guidelines allow the Conservation and Open Space Elements to be combined. Therefore, to avoid redundancy, this technical report contains the required information of these two resource-oriented general plan elements.

2.0 NATURAL RESOURCES

Air Resources

The City of Orange lies within the South Coast Air Basin, an area noted for its temperate climate and frequent air quality problems. Air quality throughout the basin is a function of the climate and the intensity and distribution of urbanization.

Climate

The climate in Orange is semi-arid and characterized by moist, mild winters and hot, dry summers accompanied by sea breezes. The average daily winter temperature is 68 degrees Fahrenheit (°F), and summer temperatures can range from 50°F to over 100°F, with an average daily reading of 83°F. Annual precipitation averages 13.16 inches per year with most of it occurring during the winter months. (SCAQMD, December 1981)

The dominant daily wind pattern consists of a daytime sea breeze blowing inland and slower night-time land breezes.

Air Quality

Wind patterns and the ambient temperature variations contribute significantly to the air quality conditions throughout the air basin. The basin experiences frequent temperature inversions whereby the ambient air temperature increases rather than decreases with altitude, forming an inversion layer of still air. Low wind speeds, combined with inversion conditions, hamper the dispersion of pollutants into the upper atmosphere and in the process form layers of high pollutant concentrations. In the winter, the pollution may be dispersed by surface winds strong enough to spread the pollutants horizontally. During the summer and warm autumn months, continued heating of surface air temperatures can weaken and break the inversion layer, resulting in a sudden clearing of smog in the late afternoon or early evening hours.

Air quality in Orange is a function of these meteorological conditions and regional and local levels of pollutant emissions. Motor vehicles are responsible for a great majority of pollutant emissions throughout the South Coast Air Basin. Although in a regional context the City of Orange may not contribute significantly to the number of

vehicles on the road network, the three regional transportation routes passing through the City (the Costa Mesa, Santa Ana and Garden Grove Freeways) may contribute to local air quality problems.

Local air quality data are available from the South Coast Air Quality Management District (SCAQMD). In the vicinity of Orange, the SCAQMD maintains air quality monitoring stations in Anaheim and El Toro.

The primary pollutants monitored include carbon monoxide, ozone, nitrogen dioxide and sulfur dioxide. Table OSC-1 describes the causes and effects of these and other pollutants present in the area.

Ozone, the invisible gas which impairs breathing during the hot summer and autumn months, is the primary contributor to poor air quality in the Southland. As Table OSC-2 indicates, during the past three years, the State standard for maximum ozone concentrations was exceeded 18 to 19 percent of the year in the Anaheim source/receptor area and from 10 to 17 percent of the year in the El Toro source/receptor area. Although State air quality standards for other constituents were not exceeded, limited individual episodes approached the State standards. The SCAQMD indicates that basinwide, air quality conditions are improving despite continued regional growth.

The data displayed in Table OSC-1 may be somewhat misleading in that overall, State standards were surpassed on a limited number of days. However, some people encounter breathing difficulties and otherwise suffer ill effects from even lower concentrations of pollutants. Therefore, the data presented are not indicative of general air quality and its related health effects.

Air Quality Management

Recent improvements in regional air quality may in part be a result of the SCAQMD's increased efforts to monitor and control stationary source emissions. Also, improved exhaust emission systems on cars and trucks have reduced the levels of carbon monoxide, hydrocarbons and oxides of nitrogen released into the atmosphere.

TABLE OSC-1
AIR POLLUTION CONSTITUENTS
AND THEIR EFFECTS

Pollutant Type	Description	Effects	Sources
Carbon Monoxide (CO)	Colorless, odorless, toxic gas produced by incomplete combustion of carbon-containing substances.	Passes through lungs into bloodstream. Deprives sensitive tissue of oxygen. Not known to have adverse effects on vegetation, visibility or material objects.	Gasoline-powered motor vehicles
Oxides of Nitrogen (NOx)	Two types, Nitric Oxide (NO), and Nitrogen Dioxide (NO ₂). NO is a colorless, odorless gas formed when combustion takes place under high pressure and/or temperature. NO ₂ forms by combustion of NO and oxygen. Participants in photochemical smog reactions.	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles primary source. Other sources: petroleum refining operations, industrial sources, ships, railroads, aircraft.
Sulfur Dioxide (SO ₂)	Colorless, pungent gas formed by combustion of sulfur-containing fossil fuels.	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron and steel. Limits visibility and reduces sunlight.	Fuel combustion primary source. Other sources: chemical plants, sulfur recovery plants, and metal processing.
Photochemical Oxidant (Ox)	Consists primarily of ozone. Created in atmosphere, not emitted directly, during photochemical process. Ozone is a pungent, colorless toxic gas.	Common effects are damage to vegetation and cracking of untreated rubber. High concentrations can directly affect lungs, causing irritation.	Motor vehicles major source of emission of NOx and reactive hydrocarbons.
Particulates	Made up of finely-divided solids or liquids such as soot, dust, aerosols, fumes, and mists.	May irritate eyes and respiratory tract. Absorbs sunlight, reducing amount of solar energy reaching the earth. Produces haze and limits visibility. Can damage materials.	Dust and fume-producing industrial and agricultural operations, construction, combustion products including exhaust, atmospheric photochemical reactions. Natural activities such as wind-raised dust and ocean spray.
Hydrocarbons and Other Organic Gases	Includes the many compounds consisting of hydrogen and carbon, found especially in fossil fuels. Some highly photochemically reactive.	Not known to cause adverse effects in humans. May damage plants.	Motor vehicles major source. Other sources: petroleum refining, petroleum marketing operations, and evaporation of organic solvents.

Source: South Coast Air Quality Management District, "Air Quality Handbook for Environmental Impact Reports", Revised Dec., 1983.

TABLE OSC-2
AIR QUALITY DATA FOR SOURCE/RECEPTOR AREA NOS. 17 AND 19

Pollutant (State Standard)	Max. Concentration in PPM, 1-hour			Number of Days State Standard Exceeded		
	1984	1985	1986	1984	1985	1986
A. Source/Receptor Area No. 17 (Anaheim)						
Carbon Monoxide (20 PPM)	18	19	16	0	0	0
Ozone (> .10 PPM)	.25	.25	.20	65	70	64
Nitrogen Dioxide (> .25 PPM)	.24	.28	.21	0	0	0
Sulfur Dioxide (> .05 PPM, 24-hr.)	.08	.03	.03	0	0	0
B. Source/Receptor Area No. 19 (El Toro)						
Carbon Monoxide (20 PPM)	8	10	7	0	0	0
Ozone (> .10 PPM)	.30	.28	.23	61	61	38
Nitrogen Dioxide (> .25 PPM)	NM	NM	NM	NM	NM	NM
Sulfur Dioxide (> .05 PPM, 24-hr.)	NM	NM	NM	NM	NM	NM

Abbreviations: PPM=parts per million; NM=not measured.

Source: South Coast Air Quality Management District.

Monitoring and improving the basin's air quality is the responsibility of the SCAQMD. As mandated by the State Lewis Air Quality Act of 1976 and 1977 and amendments to the Federal Clean Air Act, the SCAQMD, in conjunction with the Southern California Association of Governments (SCAG), has prepared an Air Quality Management Plan (AQMP) which outlines strategies for improving regional air quality. In addition, in 1985 the SCAQMD established more definitive air quality improvement programs in its publication "Long Range Strategies for Improving Air Quality." The SCAQMD's Rules and Regulations serve as the primary vehicle for implementing the regional air quality improvement programs.

Water Resources

According to City Water Department officials, Orange relies on local surface and ground water resources to meet approximately 70 percent of its domestic and agricultural water needs. The remaining 30 percent of water demand is met with imported water obtained from the Metropolitan Water District of Southern California (MWD) or the State Water project. The primary source of MWD water is the Colorado River.

Surface Waters

Surface waters within the planning area include the Santa Ana River, Santiago Creek, Handy Creek, Irvine Lake, Villa Park Reservoir and Peters Canyon Reservoir. None of these water resources is considered a navigable waterway for commercial purposes, although Irvine Lake is available for recreational boating. The creeks and rivers serve as drainage courses for thousands of acres of watershed in and Orange. The two reservoirs and Irvine Lake are man-made lakes impounded behind earth-filled gravity dams.

Santa Ana River: The Santa River, which extends 90 miles from its headwaters in the San Bernardino Mountains to the mouth at the Pacific Ocean, runs along the western edge of the City. The river drains approximately 3,200 square miles of watershed in Orange, Riverside and San Bernardino Counties. Until 1941, the river flowed freely and supplied towns along the river with a direct source of water for domestic and agricultural uses. Following construction of Prado Dam in 1941 (upstream from Orange), flows were reduced to seasonal storm

run-off. This run-off now is used to recharge ground water basins via direct river bed percolation or percolation in settling basins. Limited volumes of water are pulled directly from the river for agricultural irrigation.

Santiago Creek: Santiago Creek flows through the City in a northeast-southwest direction. Flow begins upstream from Irvine Lake in the Santa Ana Mountains. Irvine Lake captures and impounds the flow and releases excess flow into Villa Park Reservoir. From Villa Park Reservoir, the creek winds through the City, connecting to the Santa Ana River just south of the city limits. Santiago Creek serves as a major flood control facility for Orange, providing a drainage course for waters released from Villa Park Reservoir as well as for urban run-off below the reservoir. The Orange County Flood Control District maintains a series of detention basins along the creek which serve to reduce flow volumes and to recharge local ground water basins.

Information supplied by the Water Advisory Committee of Orange County indicates that Santiago Creek flows range from 3,000 to 20,000 acre feet per year, but average flows for the last 14 year period (ending in 1986) have been 10,000 acre feet per year. (Water Advisory Committee of Orange County, page 18)

Handy Creek: Handy Creek is a minor watercourse which runs from the Peters Canyon Reservoir, through Orange Park Acres and into Santiago Creek (Figure OSC-1). Portions of the creek have been channelized above and below ground. The creek serves as a drainage course for urban run-off.

Irvine Lake: Of the three water bodies mentioned above, Irvine Lake is the largest with a capacity of 25,000 acre feet. The lake, located upstream from Irvine Park (a regional County park), is a private facility owned jointly by the Irvine Ranch Water District and the Serrano Irrigation District. Both districts use the water for agricultural irrigation. In addition, the lake is used for recreational boating and fishing. OCWD considers Irvine Lake as a facility capable of providing significant long-term storage for domestic water supplies.

Villa Park Reservoir: The Orange County Flood Control District owns and operates Villa Park Reservoir. The reservoir's primary function is flood control, although it also serves as a ground water recharge basin. Reservoir capacity, as measured at the crest of the spillway, is 16,044 acre feet.

Peters Canyon Reservoir: The Irvine Ranch Water District also owns Peters Canyon reservoir, located as shown on Figure OSC-1. This private facility was constructed over 40 years ago to provide irrigation water for former Irvine Ranch crops and rangeland. Today the water body provides flood control protection for properties within the Handy Creek watershed and also continues to provide irrigation water for the Irvine Ranch Water District. County Flood Control officials indicate that Orange County is considering acquiring the lake for recreational use in association with a future park.

Ground Water

Orange overlies a portion of the Lower Santa Ana River ground water basin. The basin covers approximately 200,000 acres and extends roughly from below Prado Dam, south toward Seal Beach and Newport Beach and east along the Santa Ana Mountains (Figure OSC-1). Many cities throughout central Orange County depend on this basin for domestic water supplies. As indicated above, the City of Orange obtains approximately 70 percent of its municipal water supply from this resource.

Basin management responsibility lies with the Orange County Water District (OCWD), which ensures that ground water levels are maintained. OCWD either collects flow from regional surface waterways or purchases water from the State or water wholesalers for basin recharge purposes. OCWD operates two ground water basin recharge facilities within the planning area. The Santa Ana River serves as the primary recharge area. Along Santiago Creek, OCWD uses abandoned gravel pits at Prospect Avenue and Bond Street for recharge purposes.

Each year OCWD dictates how much water the City may withdraw from the basin to meet customer service demands. On the average, Orange may not obtain more than 70 percent of its water from local ground water supplies. As of October 1987, the City's own water department operated a total of 15 wells for ground water withdrawal.

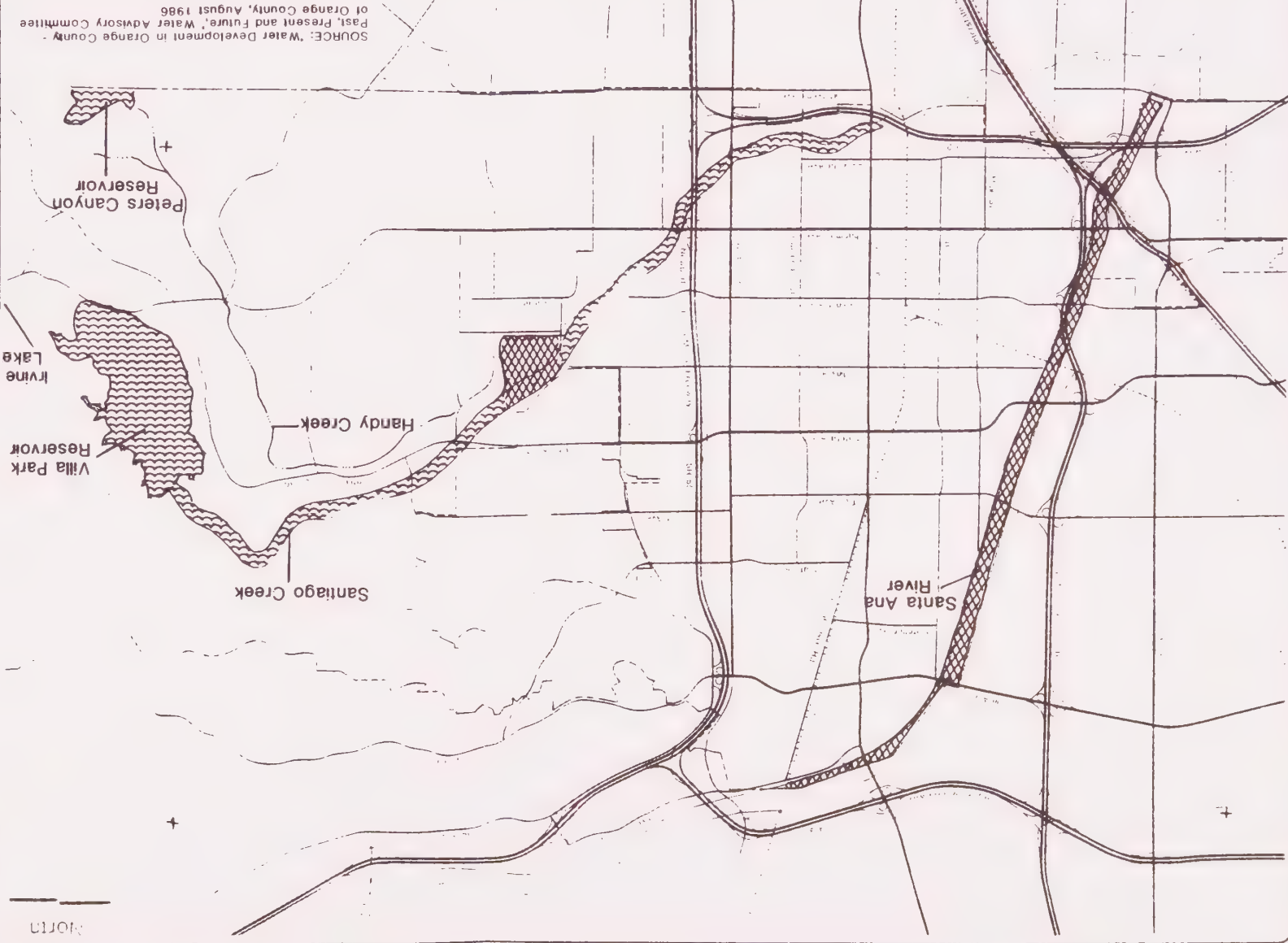
Due to careful and consistent basin management by OCWD, the water level of the Lower Santa Ana Basin, as well as the water quality, has remained relatively stable. The water quality in Orange meets all State and Federal secondary drinking water standards. Past problems have been limited to excess amounts of air and carbon dioxide in the water. These excesses impart a characteristic, but harmless, taste and odor to the water.

Although ground water levels have remained relatively stable in the past 30 years due to OCWD's efforts to minimize overdrought, a report prepared by the Water Advisory Committee of Orange County (WACO) predicts that growth countywide will gradually reduce basin levels. During the 1984-85 fiscal year, withdrawal from the basin totaled 252,000 acre feet. According to the WACO report, by the year 2005, demand could reach over 550,000 acre feet per year. WACO states:

"it is uncertain whether or not it will be physically possible to replenish the subsurface reserve at a rate that could offset this level of annual requirements. OCWD has suggested that water planners in the District should anticipate that ultimately over 50 percent of their supply will be furnished from the ground water reserve" (WACO, page 58)

In other words, Orange will become increasingly dependent on imported water to meet municipal demands.

Groundwater Recharge Areas
Surface Water



SOURCE: "Water Development in Orange County - Past, Present and Future," Water Advisory Committee of Orange County, August 1986

Figure OSC-1
Water Resources

Mineral Resources

Orange contains extensive deposits of sand and gravel within and surrounding the Santiago Creek and Santa Ana River channels. In 1982, the California Department of Conservation, Division of Mines and Geology (CDMG), prepared a report detailing the characteristics of sand and gravel resource areas in the greater Los Angeles area. The portion of the report "Mineral Classification of the Greater Los Angeles Area" relative to the City of Orange is summarized here. (CDMG, 1981)

Aggregate Resources

Sand and gravel resources are known collectively as "aggregate materials." Aggregate is the primary component of Portland cement concrete, a material vital to the construction industry. New construction and growth throughout Southern California is dependent upon the continued availability of locally extracted, inexpensive supplies of sand and gravel for concrete products.

The CDMG has identified sand and gravel reserves throughout the greater Los Angeles area capable of supplying aggregate materials for regional concrete demand for the next two decades. Reserves are defined as "those materials acceptable for commercial uses that exist within property owned or leased by an aggregate producing company and for which permission allowing extraction and processing has been granted by the proper authorities." (CDMG, 1981) To support future needs beyond the next twenty years, the CDMG has identified extensive resources which may be mined later upon the granting of necessary permits and the development of new extraction methods and technologies.

CDMG Classification

The Los Angeles study area has been divided into resource regions, and the aggregate resources in each region have been classified in accord with the CDMG's Mineral Resource Zone (MRZ) classification system. The four zone classes may be described as follows:

MRZ-1 - Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence. This zone is applied where well-developed lines of reasoning, based upon economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is nil or slight.

MRZ-2 - Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that there is a high likelihood for their presence. This zone is applied to known mineral deposits or where well-developed lines of reasoning, based upon economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high.

MRZ-3 - Area containing mineral deposits, the significance of which cannot be evaluated from available data.

MRZ-4 - Areas where available information is adequate for assignment to any other mineral resource zone.

(Department of Conservation, page 11)

The CDMG has established the mineral resource classification system as a means of ensuring that adequate supplies of mineral resources are available to meet the needs of California's economy. (Reference 3, page 9) Authority to designate lands is granted by the Surface Mining and Reclamation Act (SMARA) of 1975.

SMARA directs City and County governments to use the mineral resource information provided by the CDMG to develop land use policies and programs and to ensure that land use decisions recognize the long-term importance of the resources to the regional and Statewide economy. Section 2762 of the State Public Resources Code requires jurisdictions to establish mineral resource management policies which:

- Recognize mineral information classified by the State Geologist and transmitted by the (State Mining and Geology) board;

- ° Assist in the management of land use which affect areas of statewide and regional significance; and
- ° Emphasize the conservation and development of identified mineral deposits.

Significant Resource Areas

Within the established mineral resource zones, CDMG has designated specific areas as "Regionally Significant Aggregate Resource Areas," also referred to as "Resource Sectors." Designated resource sectors in the City of Orange are included within the Lower Santiago Creek Resource Area and the Santa Ana River Resource Area. Figure OSC-2 indicates the resource area boundaries established by the CDMG. The boundaries encompass the known or inferred extent of the sand and gravel resources.

Lower Santiago Creek Resource Area: The Lower Santiago Creek area is divided into two resource sectors, Sector J and Sector K (Figure OSC-2). Together these sectors are estimated to contain 263.6 short tons, or 18 percent, of the 1,468.2 short tons of aggregate identified within the study area as indicated in Table OSC-3.

Sector J has a designation of MRZ-2, indicating that the area contains significant mineral deposits. The CDMG estimates that Sector J, which lies wholly within the City limits, contains 233.6 million tons of aggregate resources at an average density of .065 tons per cubic foot. The resource extends to an approximate depth of 400 feet, although drill logs indicate that below 200 feet the material has an inconsistent economic quality. Groundwater levels prevent excavation below the 400 foot depth. Sector J contains one active quarry. Figure OSC-2 indicates existing and former quarry sites.

Although Sector J may contain significant reserves, much of the surface area of Sector J outside of the creek channel and flood plain has been urbanized. The urbanization will undoubtedly preclude recovery of all known sand and gravel deposits. Future recovery operations, if any, will be concentrated in and along the stream bed. The CDMG has not estimated the amount of material which can be mined reasonably, recognizing existing land use patterns. Also, the CDMC indicates that Orange County surface



Figure OSC-2
Aggregate Resources

- MRZ: Mineral Resource Zone**
- Regionally Significant Aggregate Resource Area
 - Operating Aggregate Pit
- MRZ-1:** Adequate information exists to indicate no significant mineral deposit are present.
- MRZ-2:** Adequate information exists to indicate significant deposits are present, or high likelihood for presence exists.
- MRZ-3:** Deposits known to exist but significance cannot be evaluated from existing data.

SOURCE: State of California Department of Conservation, C.D.M.G. Special Report 143, Part III

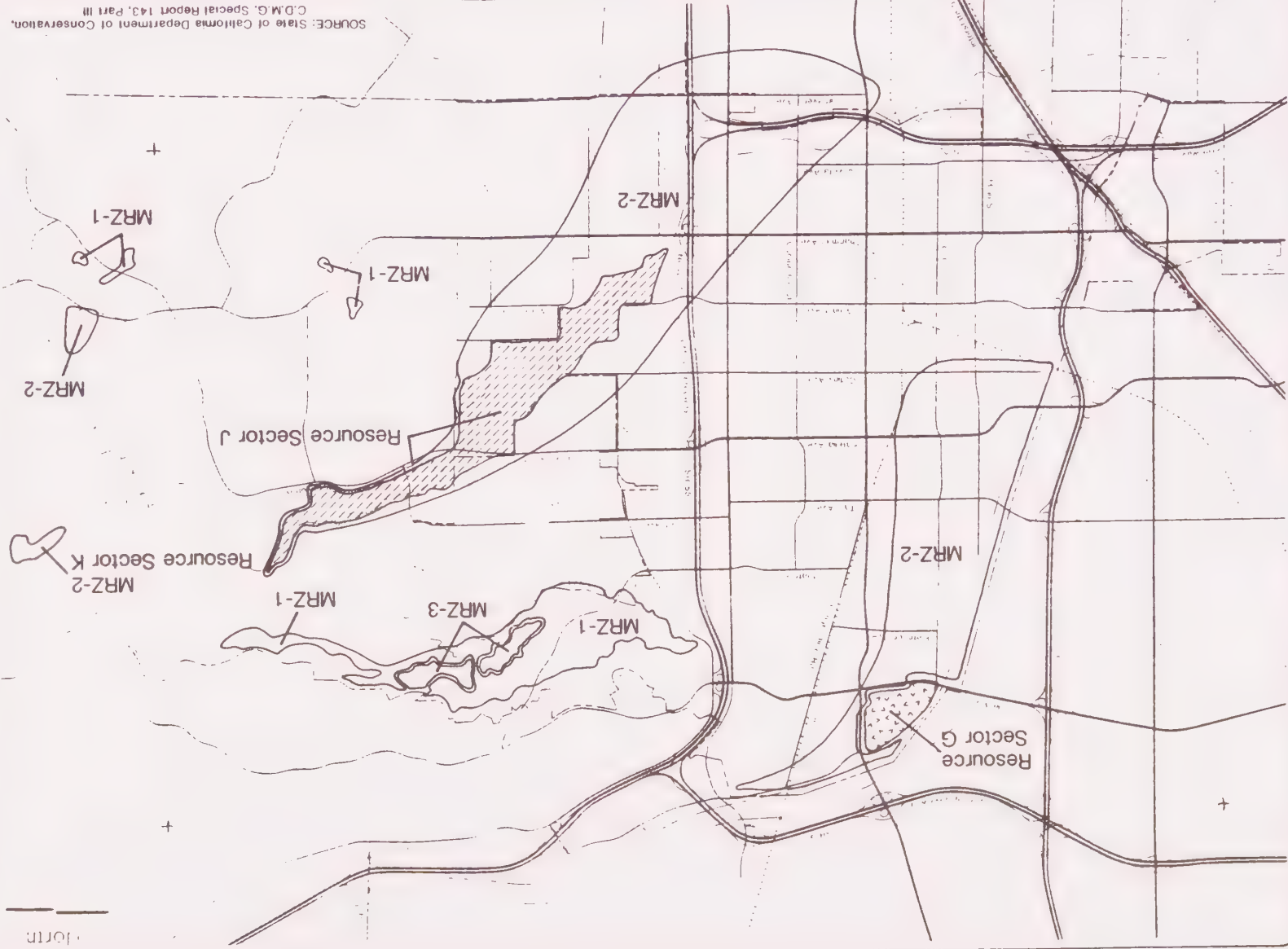


TABLE OSC-3
AGGREGATE RESERVES
IN THE CITY OF ORANGE

Resource Area	MRZ Designation	Estimated Resource (millions of tons)	Percent of Regional Resource
Lower Santiago Creek			
1. Sector J	MRZ-2	233.6	15.9%
2. Sector K	MRZ-2 MRZ-1	30.0	2.0%
Santa Ana River			
1. Sector G	MRZ-2	*	*

* The information is not available due to confidentiality of producer's data.

Source: "Mineral Land Classification of the Greater Los Angeles Area," Special Report 143, Part III, California Division of Mines and Geology, 1981.

mining regulations prohibit extraction below 150 feet. These regulations further reduce the volume of aggregate which may be recovered.

As of September 1987, the Santiago Creek channel supported only one active surface mining operation, located as shown on Figure OSC-2.

Santa Ana River Resource Area: A very small portion of the Santa Ana River Resource Area (Resource Sector G) lies within the planning area (Figure OSC-2). The resource area contains primarily sand since the upstream Prado Dam now prevents alluvium from being carried through the Santa Ana Canyon to Orange.

The minable sand resources extend to a depth of approximately 180 feet with a density of .062 tons per cubic foot. The CDMG has not published reserve and resource figures for this section of the resource area since it is actively mined and the producer's data is confidential. The sector is within the MRZ-2 classification.

Significance of the Resources

By applying the MRZ-2 and resource sector designations to the areas shown on Figure OSC-2, the CDMG has indicated that these areas are prime potential sources of aggregate. The CDMG estimates that Sector J contains 16 percent of the known sand and gravel resources within the Orange County-Temescal Valley (in Riverside County) production-consumption region. As the Orange County population continues to grow, construction projects will demand an increasing amount of this resource. Current estimates place the Orange County aggregate demand at 840 million tons for the next 50 years.

Construction requires concrete products made from the aggregate. If aggregate resources lie near construction areas, construction costs can be reduced substantially due to lower transportation costs. Thus, Sector J may be considered a good source of relatively inexpensive concrete materials, which can be used to support the growth occurring throughout Orange County.

However, the CDMG points out that the Orange County region imports 16 to 20 percent of aggregate consumed from adjacent production consumption regions, namely the San Gabriel and Claremont-Upland

areas and, to a lesser extent, San Bernardino County. The CDMG states that "future aggregate supplies from these regions ...may depend on land use decisions in which the (aggregate) requirements of the Orange County-Temescal Valley (Production Consumption) Region may not be taken into account. (CDMG, 1981, page 16)

Soils

Soils in Orange may be grouped into two very general categories - flatland soils and soils occurring in the hillside areas. Because the level areas of the City are largely developed and existing soil types will minimally affect future land use decisions, these soils are only cursorily discussed here. Discussion is instead focused on the soils in the undeveloped hillslope areas in east Orange.

The soil descriptions presented here were obtained from the United States Department of Agriculture's publication "Soil Survey of Orange County and Western Part of Riverside County, California." (USDA, September 1978) Figure OSC-3 generally depicts the relationship of the various soil units.

Flatlands

Three main soil series cover the majority of the level lands east and west of the Costa Mesa Freeway. These series, described below, are the Modjeska, Myford and San Emigdio series.

Modjeska Series - This series consists of well-drained soils on terraces. The soils were formed from alluvium. In Orange the natural soil surface is almost level with slopes ranging from zero to two percent. Water runoff is slow, and the erosion hazard is slight.

Myford Series - Like the Modjeska series, Myford soils occur on gently sloping terrain (zero to two percent). The soils formed on marine terraces from sandy sediments. On bare soil, runoff is slow and erosion hazards moderate.

San Emigdio Series - This series is comprised of well-drained soils on floodplains and alluvial fans. In Orange, the soils occur on zero to two percent slopes. Runoff is slow and erosion hazards slight. Permeability is moderately slow.

None of these soils nor any of the soil types occurring in flat areas pose constraints on development.

Hillsides

In the hillside area, erosional forces and landsliding have exposed several soil units. Predominate units include the San Andreas-San Benito association (30 to 75 percent slopes, eroded) and the Altamont-Diablo association (9 to 30 percent slopes, eroded).

These associations consist of well-drained soils occurring on foothills and steeper mountainous areas. Due to the steep slopes, runoff is rapid and the hazard of erosion is high. Soils on lands in northeast Orange have moderate to high shrink-swell potential, and landslide problems are common. Existing subdivisions have experienced problems with soil creep and slippage, especially during heavy rains. Septic tanks do not operate well on the soils due to the steepness of the slopes and the shallow depth to bedrock.

Major soil series in the area north and east of Villa Park include:

Alo Clay - Slopes range from nine to 50 percent. In contrast to the soils in South Orange, this soil type has a high shrink-swell potential. The clay soils have a tendency to "creep" down a hillside, taking with them any structure not anchored to the bedrock.

Cieneba Sandy Loam and Rock Outcrop Complex - These two soil mapping units are found on 30 to 75 percent slopes. Surface cobbles, stones and large outcrops occur in numerous places. Runoff is rapid and erosion hazards high due to the steep slopes.

South of Villa Park the primary units are:

Cropley Clay - These soils formed from fine textured alluvium derived from sedimentary rocks. In Orange, this clay occurs on slopes ranging from zero to nine percent. Most of the area in east Orange with this soil type has been developed.

Myford Sandy Loam - Myford hillside soil units occur on slopes of 2 to 15 percent. Typically, the slopes are terrace side slopes. Erosion hazards are moderate to high, depending on the slope. This soil percolates very slowly; consequently, it is generally unsuitable for septic tank disposal systems.

Agricultural Resources

As indicated above, on steep slopes all of these soil units are highly susceptible to erosion hazards, including landsliding. While erosion hazards do not place insurmountable constraints on hillside development, erosion and other problems associated with steep slopes require special attention and treatment in site planning processes.

As the City's name might suggest, for many years Orange was a farming community planted with vast acres of citrus orchards. Field crops and groves covered the rich loam soils below the foothills, and range cattle grazed on the grassy hillslopes stretching north and south of Santiago Creek.

As of September, 1987, agricultural land accounted for only two percent, or 212 acres, of the total acreage of the General Plan planning area. The Orange County Agricultural Commission reported that only about 67 acres were planted with commercial crops, and none of the commercially cultivated areas were contained in agricultural preserves. Wholesale growing grounds, nurseries and agricultural uses associated with large lot residential development comprised the remainder of the 145 acres of agricultural land.

Due to the extensive urbanization which has occurred throughout the planning area, agriculture is no longer considered a significant resource in the City.

Plants and Wildlife Plants

Comprehensive studies of plant and animal resources Citywide have not been prepared. The information presented in this section has been drawn primarily from environmental impact reports which have been prepared for projects in the undeveloped portions of the City. References are made where appropriate.

With the exception of the hills on the eastern end of the planning area, Orange has been completely urbanized and landscaped with largely non-native plant species. The undeveloped hillside areas contain diverse natural plant communities. These communities include grasslands, coastal sage scrub, chaparral, woodland and disturbed areas. (Serrano Heights DEIR, page 51)

Grassland Community - Grasslands occur on ridges and slopes which do not receive direct sun. Although past grazing activity has removed many of the native species from the hillsides, non-native grasses, forbs and wildflowers have established themselves in abundance. None of the existing plant species are rare or endangered. However, grasslands serve as important foraging areas for raptors and other animals.

Chaparral Community - Chaparral communities cover rocky, south-facing hillslopes as well as sandstone outcrop areas. Typical species in this community include California sagebrush, buckwheat and black sage, and prickly pear cacti may be found scattered about the hills of Orange. In Orange, the coastal sage scrub community does not contain any rare or endangered species.

Coastal Sage Scrub Community - The coastal sage scrub transitions into chaparral communities containing unremarkable plant species including chamise and black sage. Chaparral consists of dense brushy undergrowth and woody shrubs which burn easily and quickly and, therefore, present constant threat of wildland fire.

Woodland Community - The woodland areas occur along streams (riparian woodland) and on cooler, north-facing slopes (southern oak woodland). Stands of coast live oaks, willows and sycamores populate the riparian areas, especially along Santiago Creek.

In the hilly areas, coast live oaks and walnuts lie scattered in canyons and across hillslopes. Although the trees are not considered rare or endangered, they do provide nesting areas for birds.

Disturbed Areas - Disturbed areas, as the name implies, are vegetative communities which have been disturbed significantly by human activity. These areas occur along dirt roads and eroded gullies. The sparse vegetation consists of weeds, mustards and artichoke thistle. (Upper Peters Canyon DEIR, page 30)

Wildlife

Many species of wildlife populate the open, grassy hills and woodland areas of east Orange. The grasslands provides suitable foraging grounds for mammals and birds, and the woodland trees are used by many species for nesting. Prior biological studies indicate that these areas are important habitat areas in that they serve as a natural extension of the regionally significant Weir Canyon and Santiago Oaks Regional Park Wildlife Areas. (Serrano Heights DEIR, page 52)

Most animal species found in the hills are fairly common varieties such as mourning doves, finches, gophers, rabbits and garter snakes. Bobcats, coyotes and mule deer have been observed in outlying areas.

Sensitive species known to forage in the hills include turkey vultures and northern harriers, both of which are blue-listed by the National Audubon Society. (The Audubon Society's "blue list" is a watch list for species in danger of becoming rare or endangered.) Golden eagles, which are fully protected, may feed in the area. Additionally, two lizard species - the coast horned lizard and the orange throated whiptail - may occur. The State Department of Fish and Game lists these species as "depleted." (Serrano Heights DEIR, page 54)

3.0 CULTURAL RESOURCES

Archaeological

Archaeological records suggest that Orange County has had a constant human occupation that may extend as far back as 30,000 years ago. The most recent native American population (from approximately 500 A.D. up through the Spanish mission period of the 1700s) was the Gabrielino culture, a takic-speaking group of Shoshonean people. The Gabrielinos occupied much of Orange County at the time of European contact, including the present day City of Orange.

Archaeologists know little about the prehistoric Gabrielino way of life but surmise that the Gabrielinos were a hunter/gatherer society which practiced some trade with other surrounding cultures. The Gabrielinos established permanent villages and satellite communities in lowland areas along streams, in sheltered areas along the coast and atop flat promontories overlooking arroyos. Tools used by these people included bone, wood and stone hunting implements such as clubs and arrows. Food preparation was assisted by bedrock and potable mortars for grinding, wooden and shell spoons for stirring, as well as wooden bowls, pottery vessels and basketry for cooking and serving.

With the coming of Spanish explorers and the establishment of the missions in the mid-1700s, the Gabrielino culture began to decline. In 1770, the Gabrielino population numbered about 5,000. By the early 1900s, it was thought to have "ceased to exist as a culturally identifiable group," although in 1986 an archaeologist reported some 1,500 descendants of the original Gabrielino and Fernando groups from the San Gabriel and San Fernando Valleys. (Blodgett, December 19, 1987)

Evidence of the past occupation of the Gabrielino people is abundant in and around the City of Orange. Previous archaeological surveys performed throughout the area have revealed bedrock mortars, surficial scatter of tool flakes and fragments and possible campsites and villages. The majority of the finds have occurred in the hillsides, and strong possibilities exist that undeveloped hill areas contain surface and subsurface cultural deposits. (Blodgett, December 28, 1987)

Historical Resources The 1983 Orange General Plan Historic Preservation Element contains a colorful and descriptive history of the City. Portions of that history are repeated here verbatim. (Historic Preservation Element, pages 9-16)

History of Orange

Like other cities in Orange County, Orange was founded as a real estate venture. Two men, Andrew Glassell and A. B. Chapman acquired the land for the founding of Orange in trade for legal services they had rendered. In 1871 they subdivided the land into saleable town lots reserving eight lots in the center for a public Plaza. Orange has the distinction of being the only American town in the region which was laid out around a Plaza in the manner pioneered by William Penn in the design of Philadelphia and other east coast cities.

Messers. Chapman and Glassell originally named their new town Richland but in 1873 it was changed to Orange because another town of Richland already existed in California. Glassell's brother, Captain William T. Glassell, laid out the town on a north-south axis with two major spoke streets intersecting the Plaza. These two streets were named Chapman and Glassell. It was envisioned from the beginning that the core area near the Plaza would form the commercial heart of town and the outlying and adjacent streets would form the residential districts. This same pattern of development still remains today in Old Towne.

The first decade and a half in Orange was rather quiet. A few pioneers trickled in, but it was not until the real estate "boom" of the late 1880s that considerably more people arrived. The railroad rate war of 1887 that caused a new flow of immigrants to California resulted in a boom for Orange as well. Much happened in Orange in the four quick boom years. In 1885 the first newspaper was founded, in 1887 the railroad arrived and the first bank was opened, in 1888 the City was incorporated and by 1890 the population reached 866.

The boom years saw the creation of other new towns nearby. McPherson and El Modena, both in what is now east Orange, were two of the most prolific. While most traces of McPherson have since vanished, El Modena continues today as a vibrant community

with a considerable concentration of homes that were constructed after the boom and following the turn of the century.

In 1889, Orange vied to become the County seat. When not selected, she settled back down to operating as a quiet, small town and began to emerge as a self-sufficient and friendly community setting the trend for a way of life that still continues today.

During this time, some businesses which still exist today and some businesses that were forefathers of those which exist today came into being. Prime among them are Watson's Drug Store (founded 1899), The Orange County Fruit Exchange (now a part of Sunkist), which incorporated in 1893, and the Wells Fargo Bank Branch-a successor to the 1886 Bank of Orange.

The citrus industry which formed the mainstay of the City's economy continued to grow during the first quarter of the century. Beginning about 1912, another economic surge began which produced nearly two decades of prosperity. During this time, the commercial core grew rapidly with handsome two story buildings being constructed to form what now comprises the Plaza Historic District. These buildings were generally constructed of brick and featured ornamental cornices with special architectural emphasis also given to the fenestration. That these buildings were built in a solid manner with an architectural appeal is backed up by the fact that they still remain in popular use today.

As the citrus economy continued to flourish on into the Twenties, the demand for housing grew and the residential styles changed from the older Victorian and the California oriented Craftsman houses to the European influenced Tudor, Provincial, Mediterranean and Norman Revival styles. These were the style preferences that the World War I soldiers brought home with them. Having seen the country houses while doing battle in Europe, they instructed the local contractors here to build in the European manner. The Mediterranean Revival style was by far the most popular in Orange.

With the Thirties came the Depression and a collapse of the housing industry. Building virtually came to

a standstill until after the war years when once again the housing business boomed. But instead of the individualized custom construction that characterized the houses before World War II, after the war, houses were built in singular styles in large tracts. The houses that remain in the Old Towne environs and throughout Orange from the period before 1940 are an important part of the legacy of Orange and remain today as significant features of the urban environment of the City.

Recognizing the City's Heritage

In September of 1981, the City hired Heritage Orange County, Inc., a local historic preservation consulting firm, to conduct a survey and identify and inventory historic buildings within the City. Historic buildings were defined as structures constructed before 1940 which have retained their original architectural integrity or have undergone only minor alteration. (Historic Preservation Element, page 18) The survey identified a total of 1,377 historic homes and buildings eligible for listing on the the State Historic Resources Inventory. The City notes that the structures are only eligible for listing. In order to receive a listing, a structure must be rehabilitated in accord with the Secretary of the Interior's guidelines and must go through a lengthy nomination process.

Subsequent to the completion of the historic resources survey, the City prepared and adopted a Historical Preservation Element for the General Plan. The Element identifies major buildings and places of historic significance and provides guidelines for protecting the City's historic resources. The goals, policies and implementation measures contained in the 1983 element will be incorporated into the Conservation Element of the 1987/1988 General Plan update.

Significant structures generally lie within one of three districts - Old Towne, Nutwood Place and El Modena (Figure OSC-4). Scattered throughout the City are old farmsites which contain a total of 25 homes and buildings considered historically significant.

Old Towne: Old Towne encompasses an eight block area centered around the Plaza Historic District, the City's original town square (Figure OSC-4). In

addition, the Old Towne district includes the Nutwood Tract, a residential neighborhood north of W.O. Hart Park which was subdivided in 1906 as the first neighborhood in Orange. (Historic Preservation Element, page 19) In all, the district contains over 1,200 historic houses and other buildings representing six decades of architectural styles and tastes.

Not all structures within the Old Towne district are considered historic. Buildings constructed after 1940 are not included within Old Towne and are not subject to the preservation planning programs established for Old Towne.

The historic structures in Old Towne display a rich mixture of architectural styles, ranging from the 1880s Victorian mansions and commercial buildings to the post World War I period Revival style homes. The main Old Towne area contains 1,248 homes and buildings of historic significance, and the Nutwood Tract remains a historically cohesive neighborhood with 34 historic homes. Adding to the significance of the district is the fact that the neighborhoods and commercial areas have changed little since the early part of this century. The areas remain intact, bound together by complementary land uses (schools, parks, churches) which perpetuate the sense of community in Old Towne.

To ensure and encourage preservation of identified historic structures as a means of retaining the character of Old Towne, the City has adopted historic preservation guidelines. The guidelines address the four components comprising Old Towne: 1) the Plaza Historic District; 2) the downtown core; 3) spoke streets; and 4) the residential quadrants.

The Plaza Historic District (Figure OSC-5) is listed on the National Register of Historic Places. In addition to conforming to rehabilitation guidelines established by the City, building renovation must be performed in accord with the Secretary of the Interior's "Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings." These two controls ensure maximum protection of valuable historic resources.

Guidelines established for the other three Old Towne components indicate the building scale, site design, building materials, colors and illumination, signage and landscape standards which must be adhered to in both rehabilitation and new construction projects.

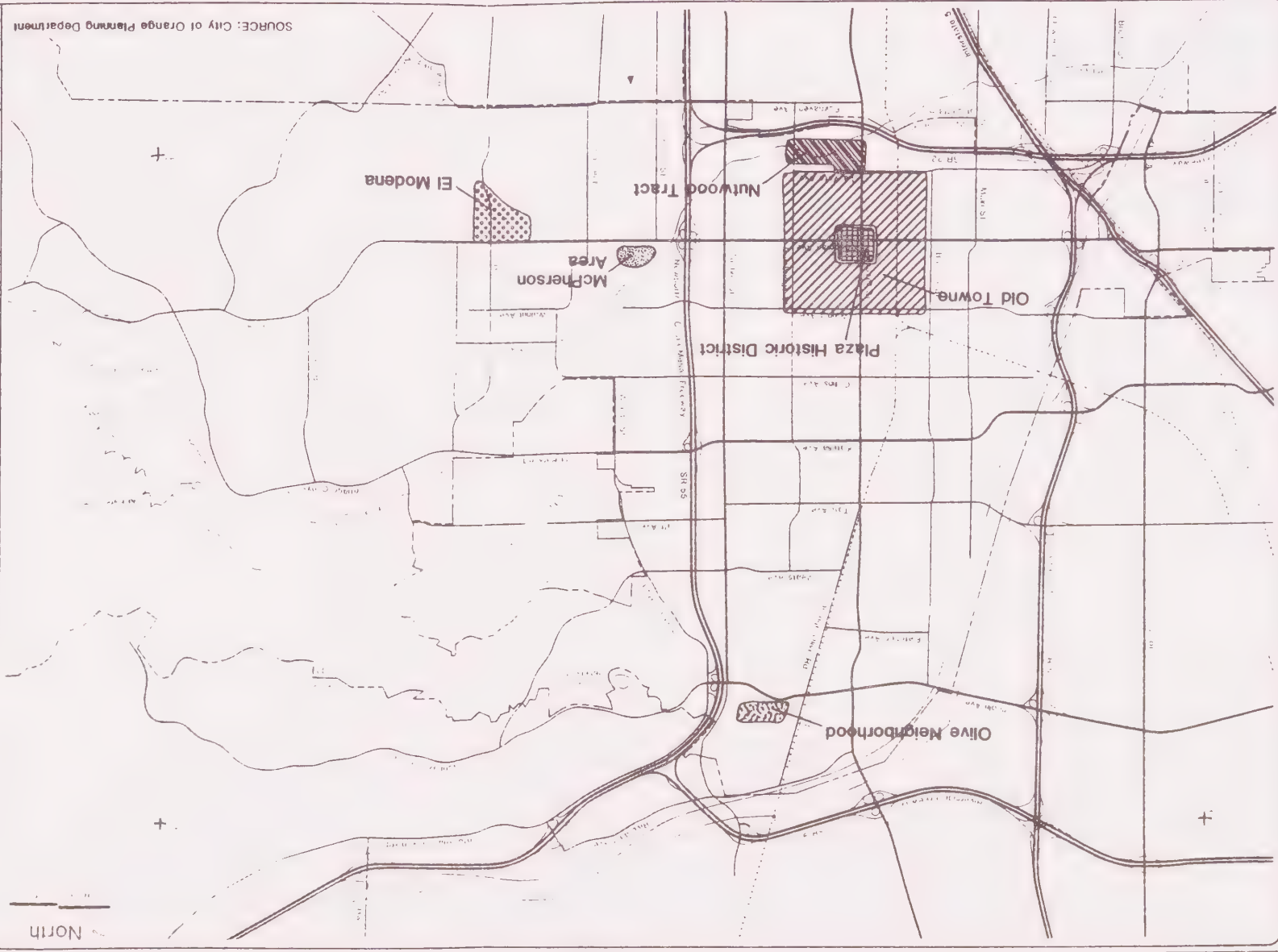


Figure OSC-4
Historic Areas

El Modena: The El Modena district lies on the east side of Orange and encompasses an area bound generally by Chapman Avenue, Hewes Street, Marmon Avenue and Esplanade Street (Figure OSC-4). The historic inventory lists 70 homes in El Modena. Constructed in the period from 1900 to 1930, most of the houses are smaller bungalow homes which provided farmworker housing for citrus industry workers. The homes are significant in that they represent examples of bungalow architecture and also serve as reminders of the City's citrus history and local Mexican-American heritage.

Other Historic Structures: Scattered throughout the City are 25 farmhouses considered to have historical significance. Formerly associated with and surrounded by citrus and other orchards, these homes are now part of the urban landscape. In many cases the houses lie along major thoroughfares, surrounded by more modern development. Although the houses now appear out of context, they nonetheless represent links to the City's agricultural past, and efforts should be made to preserve the homes whenever possible.

Several old farm buildings still stand just north of Chapman Avenue, adjacent to Santiago Creek. These buildings were once part of the McPherson farm, and today the area is still referred to as McPherson.

The Olive neighborhood in northwest Orange (Figure OSC-4) contains many houses and a church which were constructed in the early part of this century.

4.0 OPEN SPACE RESOURCES

The State General Plan Guidelines define "open space" as any parcel or area of land or water which is essentially unimproved and is used for the following purposes: 1) the preservation of natural resources; 2) the managed production of resources; 3) outdoor recreation; and 4) the protection of public health and safety. (Reference 10, page 129)

This section of the Open Space and Conservation Element Technical Report focuses on recreational open space. Also addressed are passive open space areas, such as utility easements and drainage channels, which serve no active purpose but do provide visual open space relief. Because the City plans to count among its parkland resources public school playgrounds and athletic fields, this technical report describes how these resources contribute to the Citywide inventory of open space.

Recreation Resources

In order to understand how the City's parks serve the recreation needs of the community, one must first be familiar with the standardized park classification system. These classifications may be redefined somewhat to conform to conditions in Orange.

Park Classification System

A park may best be described in terms of its size and function. The National Recreation and Park Association (NRPA) has established a standardized classification system for parks which has been adopted by many jurisdictions throughout the United States.

The three general park categories, which are divided into several sub-categories, include: local parks, regional parks and unique park space. All of the classification descriptions provided below are taken from the NRPA's publication "Recreation, Park and Open Space Standards and Guidelines." (NRPA, pages 56 and 57)

Local Parks: There are three types of local parks.

Mini-Park - A mini-park is a specialized facility that serves a concentrated or limited population, such as tots or senior citizens. Mini-parks generally do not exceed one acre in size and have a

service area radius of less than one quarter mile. As a standard, a community may contain 0.25 to 0.5 acres of mini-park space per 1,000 city residents.

Neighborhood Park/Playground - Neighborhood parks provide space and facilities for intense recreational activities like softball, court games, picnicking or skating. These parks may also contain community centers for indoor recreation programs. By definition, a neighborhood park should serve a neighborhood, which may be considered an area within one-quarter to one-half mile from the facility, or a population of 5,000 people. The NRPA standards call for 1.0 to 2.0 acres of park space per 1,000 population.

Community Park - A community park may be similar to a neighborhood park with larger or more diverse facilities for active and passive recreation, or may be an area of natural quality for walking, viewing or picnicking. Such parks serve several neighborhoods or the entire community. Park size generally exceeds 25 acres. The standards indicate a need for 5.0 to 8.0 acres of community park space per 1,000 residents.

Regional Parks: The NRPA identifies two types of regional parks which are designed to serve a large population base.

Regional/Metropolitan Park - These parks contain areas of natural or ornamental quality for outdoor recreational activities such as hiking, fishing or camping. Play areas may be provided. Regional parks, which can be as large or larger than 200 acres, serve several communities generally located within a one hour drive from the facility. Park standards call for 5.0 to 10.0 acres of space per 1,000 population.

Regional Park Reserve - Like a standard regional park, reserve areas may provide opportunities for outdoor activities. The primary use, however, is resource conservation and management. The parks may encompass several thousand acres, depending on the size of the resource area to be protected. No standard exists for park area per 1,000 population because the amount of park area varies with the regional resources available.

Unique Park Space: Unique parks vary from community to community, depending on the types of resources available. There are three categories of unique parks.

Linear Park - Linear parks are parks developed for one or more modes of recreational travel (biking, hiking or horseback riding). Any of the parks described above may also be linear parks. Park size depends on the extent of a trail system contained within the park. Standards for service area and area per population are not applicable to such parks.

Special Use - Special use parks serve a single function (e.g., golf courses or marinas) or are designed to preserve areas of cultural significance. Park sizes may vary, and standards for service area and area per population are not applicable.

Conservancy - Conservancy areas may be established to protect and manage a natural or cultural environment. Recreation uses are secondary. The park size must be sufficient to protect the resource. Standards for service area and area per population are not applicable.

Existing Parks and Recreation Facilities

Orange residents have ready access to a variety of City and County parks which offer a multitude of opportunities for active and passive recreation.

City Parks: Orange contains a total of 14 City parks, three of which have not been developed. In addition, the City operates a senior citizens center which provides programs for the City's elderly residents. The largest and oldest City park is Hart Park, a 35 acre facility which includes lighted playing fields, a bandshell, tennis courts and picnic areas. Hart Park may be considered a community park. Table OSC-4 provides a description of the City parks. Park locations are indicated on Figure OSC-5.

The three undeveloped parks include Santiago Hills Park, Nohl Hills Park and Cerro Villa Park. The Santiago Hills site lies within the Peters Canyon specific plan in southeast Orange and is planned to be a full developed neighborhood park with athletic fields and playground equipment. The facility will

**TABLE OSC-4
CITY PARK AND RECREATION FACILITIES**

Park	Size	Facilities
1. W.O. Hart Park (Garden Grove Freeway at Glassell)	36 acres	Activities building, bandshell, lighted baseball diamond, horseshoe pits, picnic area, playground, lighted football/ soccer field, two lighted softball diamonds, swimming pool, tennis courts (2 lighted), volleyball courts (2 lighted) lighted)
2. Killefer Park (615 N. Lemon)	7 acres	Basketball courts(2 lighted), activity building, handball courts (2 lighted), picnic area, playground, soccer/football field, softball diamond
3. Eisenhower Park (Lincoln at Tustin)	22 acres	Animal farm, picnic area, playground, passive recreation hilly area
4. Shaffer Park (Orange Olive Rd. at Shaffer)	7 acres	Activity building, picnic area, playground, soccer/football field, ball diamond
5. Yorba Park (Yorba at Chapman)	8 acres	Little League ball diamonds (4), picnic tables, playground, softball diamond
6. El Modena Park (Hewes at Fowler)	7 acres	Picnic area, playground, lighted ball diamond
7. La Veta Park (La Veta east of Prospect)	2 acres	Picnic area, playground, lighted volleyball court, grass volleyball court
8. Olive Park (Glassell north of Lincoln)	6 acres	Little League diamonds (4)

TABLE OSC-4
CITY PARK AND RECREATION FACILITIES
(Continued)

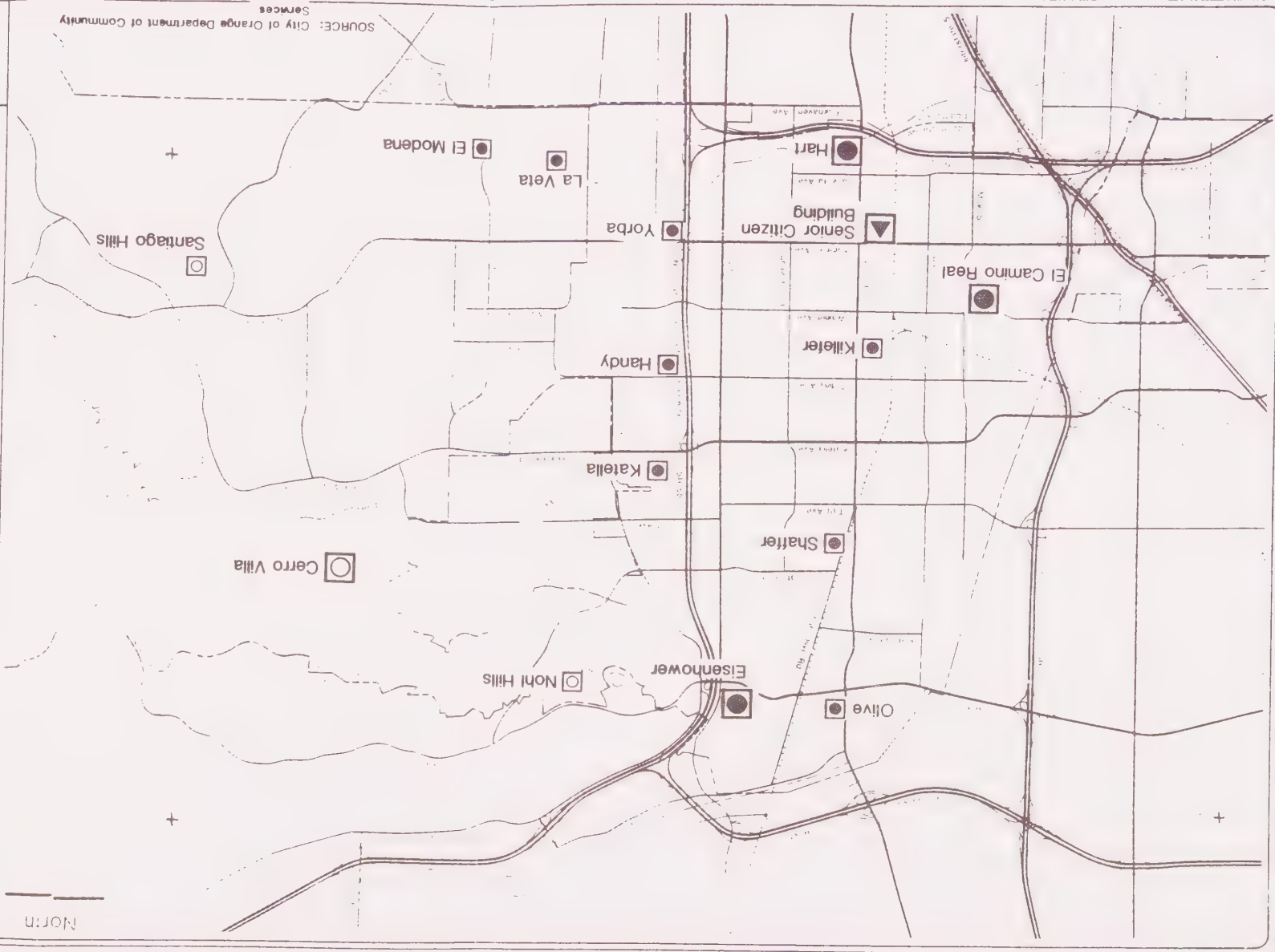
Park	Size	Facilities
9. Handy Park (2143 East Oakmont)	7.5 acres	Picnic area, soccer/football field, softball diamonds (2), sand volleyball courts (2)
10. Katella Park (1401 Handy)	3 acres	Picnic area, playground
11. El Camino Real Park (Main at Orangewood)	20 acres	Activity building, basketball courts (2 lighted), handball courts (2 lighted), horseshoe pits (6 lighted), picnic area, playground, 2 softball diamonds, 6 lighted tennis courts, volleyball courts (2 lighted)
12. Cerro Villa Park	25 acres	Undeveloped
13. Nohl Hills Park	6.5 acres	Undeveloped
14. Santiago Hill Park	8.5 acres	Undeveloped
15. Senior Citizens Center (170 Olive St.)	N/A	Main meeting room, kitchen
TOTAL PARK ACRES	165.5 acres	

Abbreviation: N/A = not applicable.

Source: City of Orange Department of Community Services

Figure OSC-5
City Park and
Recreation Facilities

- Community Parks
- Improved
- Unimproved
- Community Center
- Neighborhood Parks
- Improved
- Unimproved



SOURCE: City of Orange Department of Community Services

be developed in conjunction with proposed adjacent elementary school facilities to allow joint use of recreation resources.

Nohl Hills Park sits atop an undeveloped ridgeline just south of Nohl Ranch Road. The hilly terrain constrains the future use of the site for active recreation purposes. City staff indicates that the site may be used for more passive (picnicking, hiking) purposes. The site may be maintained in a relatively natural state.

Similarly, the 25-acre Cerro Villa site lies in the City's hillside area and is planned as a natural park. Constraints precluding full development include difficult access, surrounding large lot residential development and hillside fire hazards. Also, the site is a former County landfill, and differential settling over time could create higher maintenance costs should the site be developed.

The Department of Community Services is responsible for the maintenance of park facilities and the acquisition of new parklands. The Department also runs the City's recreation programs.

County Parks: In addition to the City-owned parks listed in Table OSC-6 there are three County parks located within or adjacent to the City limits (Figure OSC-6). Irvine Park, Santiago Oaks Park and Upper Peters Canyon are large regional parks which provide both natural open space for picnicking and hiking as well as wilderness areas for resource preservation. The wilderness areas have been set aside to provide suitable habitat for diverse plant and animal species and to preserve high quality scenic corridors.

Santiago Oaks Park consists of two park areas separated by several miles. The upper park has been developed, but the lower area has not. In the long term, the County plans to connect the parks with a series of trails. Irvine Park, Orange County's oldest regional park, contains such facilities as a petting zoo, a boating lagoon and a visitors center.

Within one hour's drive of Orange are several other County park facilities, including Mason Park in Irvine, the Upper Newport Bay Ecological Reserve,

Fairview and Talbert Parks near Costa Mesa and Centennial Park in Santa Ana and Yorba and Featherly Parks in the Santa Ana Canyon area. Table OSC-6 provides a breakdown of County parklands, and park locations are displayed on Figure OSC-6.

**TABLE OSC-5
COUNTY PARK FACILITIES**

Park	Size
A. Parks in or near Orange	
1. Irvine Regional Park	
- Natural park area	277 acres
- Wilderness area	200 acres
Total	477 acres
2. Santiago Oaks Park	
- Natural park area	110 acres
- Wilderness area	68 acres
Total	178 acres
B. Parks Within One Hour's Drive	
1. Mason Park	344 acres
2. Upper Newport Bay	174 acres
3. Fairview Park	257 acres
4. Talbert Park	137 acres
5. Centennial Park	87 acres
6. Yorba Park	166 acres
7. Featherly Park	278 acres
TOTAL ACRES	1,443 acres

Source: Recreation Element, Component II, Advanced Planning Program, County of Orange Environmental Management Agency, December 1984.

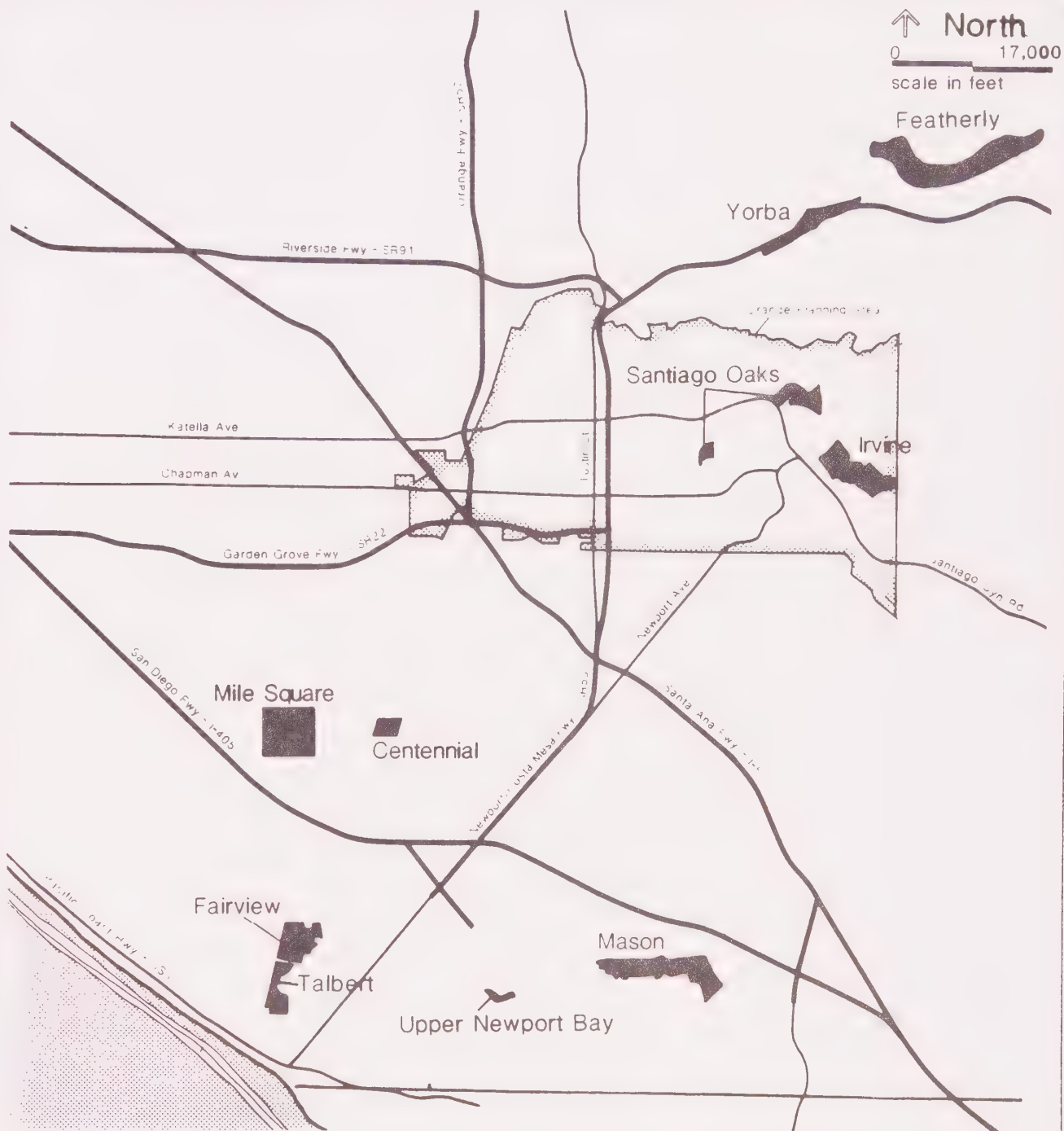


Figure OSC-6
Existing County Park Facilities

School Recreation Facilities: The City of Orange and the Orange Unified School District maintain a joint use agreement which permits the City to use school recreation facilities during non-school hours. In particular, the Department of Community Services sponsors swimming activities at El Modena and Orange High Schools during the summer months. The school gymnasium is used for basketball and volleyball programs and other City functions.

At Richland Continuation High School, the school district owns several acres of open space which it leases to the City. The City uses the ball diamond and plans to use a portion of a 5,000 square foot mobile office building to house community service programs.

Peralta Junior High on Meats Avenue is no longer used by the District, and the District has no plans to reopen the school. The grounds provide opportunities for year-round recreation. The District is studying future alternative uses for this facility.

Although the City uses several school facilities, the facilities are not included in the recreation resource inventory. However, the school grounds do offer recreation opportunities and provide visual open space relief throughout the City. Existing schools in Orange are indicated on Figure OSC-9. Schools participating in the joint use system are listed in Table OSC-6.

**TABLE OS-6
SCHOOLS PARTICIPATING IN JOINT USE PROGRAM**

School	Facilities
1. El Modena High School	Swimming pool, gymnasium
2. Orange High School	Swimming pool, gymnasium
3. Richland Continuation High School	Ball diamond, playing fields, community building
4. Various elementary schools	Fields used for soccer, softball, football practice areas
5. Chapman College	Gymnasium

Source: City of Orange Department of Community Services

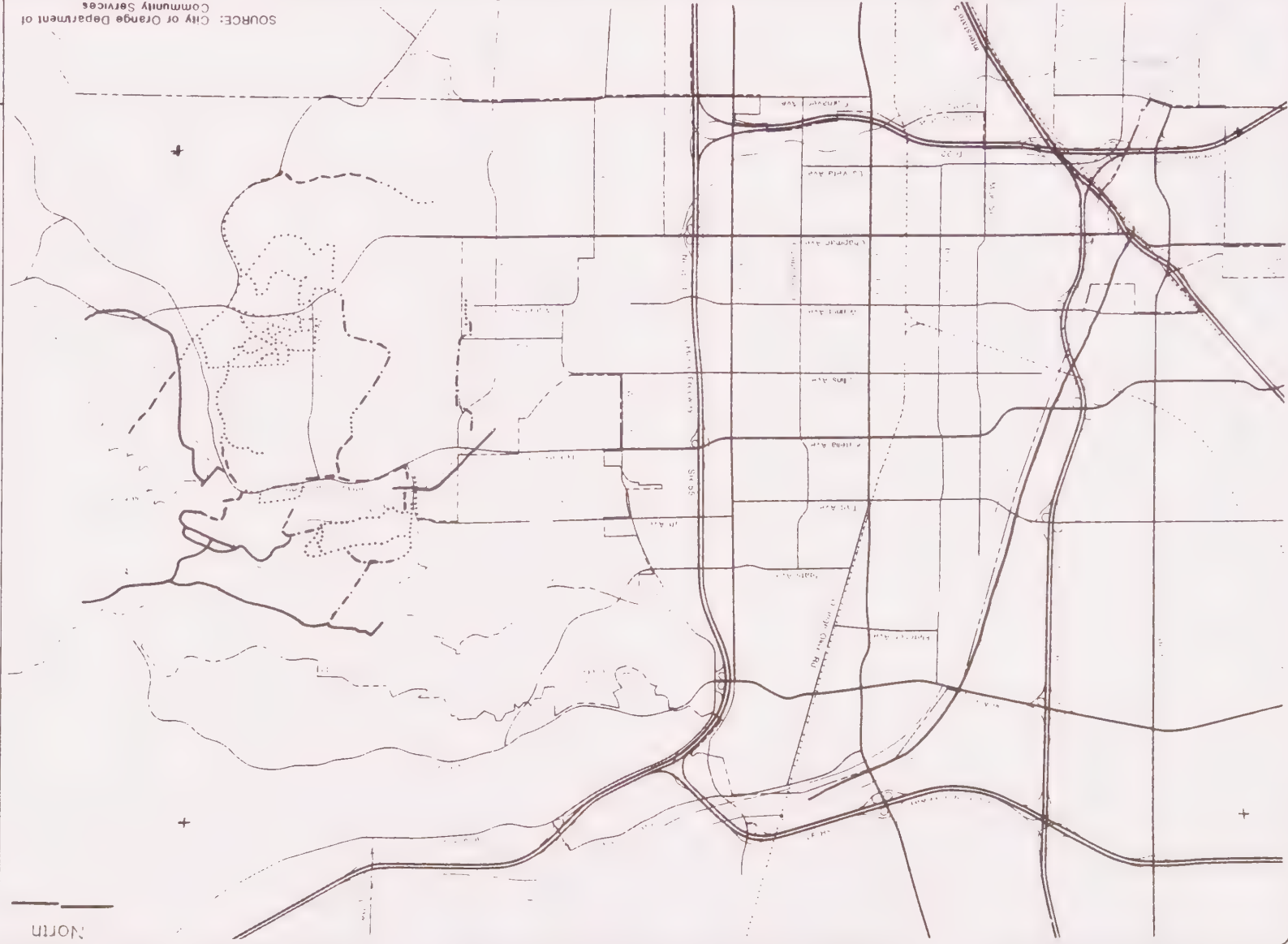


Figure OSC-7
City and County Riding
and Hiking Trails

Private Parks: In addition to the City and County parks listed in Tables OS-1 and OS-2, the City contains private parks and open space areas within condominium and apartment complexes. These areas do not contribute to the Citywide park area totals since these recreation facilities are not available to all residents.

Other Recreational Facilities: Although Orange does not have a publicly owned golf course, there are two private golf courses within the planning area. The Ridgeline Country Club lies in the Orange Park Acres area. Along Santiago Creek, just west of Tustin Street, is the Santiago Golf Course. The City Planning Department indicates that for several years the property owners have attempted to change the use of the property from a golf course to residential and commercial uses.

Recreation Trails

Recreation trails provided in Orange include bicycle riding, horseback riding, and hiking trails. The network of trails connect to a regional trail system in adjacent communities and outlying rural County areas.

Equestrian Trails: Prior to the housing boom period of the late 1960s through the 1970s, City lands east of the Rancho Santiago Boulevard contained fairly rural development, including a high percentage of equestrian lot subdivisions. The eastern portion of the City continues to be an equestrian community criss-crossed by a number of horse trails. These trails, indicated on Figure OSC-7, include trails which have been acquired by the City as well as private horse trails. The trails are largely maintained by local homeowner groups who use the trails.

The Orange County General Plan Recreation Element indicates that the County has developed 69 miles of trails, most of which are located in north Orange County. In addition, hikers and horseback riders use several hundred miles of unofficial trails which traverse private property as well as County lands in the undeveloped hill areas. Existing trails within or adjacent to the planning area include those within Irvine Park and Santiago Oaks Park (Figure OSC-7).

Bicycle Trails: For the most part, bicycle paths are incorporated into the City street system. Painted stripes and signposts mark the curb-side paths. Existing bicycle routes are shown on Figure OSC-7 and also on Figure C-5 in the Circulation Element Technical Report.

Hiking Trails: The City's master plan of trails indicates that established hiking trails coincide with the equestrian trails, as shown on Figure OSC-7.

Existing Park and Recreation Plans

The City's existing Open Space and Conservation Element indicates the extent of park facilities expansion which was to have taken place between 1973 and 1985. Of the five new park areas identified in the element, three have been provided - Katella Park, Handy Park and West Orange (El Camino) Park. Handy Park). In addition, the City has built three facilities not identified (Killefer Park, Olive Park and the senior citizen building) and has authorized construction of a new park within the Upper Peters Canyon specific plan.

County Park and Open Space Plans: In December of 1984 the Orange County Environmental Management Agency prepared a Recreation Element for the Orange County General Plan. The element shows the location of existing and planned County parks, trails and open space corridors within and adjacent to Orange. The element incorporates some features of the County's "Santa Ana River-Santiago Creek Greenbelt Plan" which was prepared in 1971. This plan proposes a series of parks along portions of the Santa Ana River and Santiago Creek linked by a series of bicycle and hiking trails.

The Recreation Element illustrates the County's intent to expand an existing park and establish three new parks in and around Orange.

In recognition of the goals of the Greenbelt Plan, the Recreation Element "Regional Recreation Facilities" map indicates that a open space corridor will be established along Santiago Creek. The corridor will include a trail (known as the Santiago

Creek Trail) which will extend from Santiago Oaks Regional Park east toward Villa Park Dam, as shown on Figure OSC-8. The Recreation Element does not indicate the width of the corridor or specific corridor improvements, although the Greenbelt Plan provides schematic plans for corridor treatment. However, many of the agricultural uses which were in place adjacent to the creek when the Greenbelt Plan was developed have been replaced with urban land uses. Therefore, additional consideration should be given to the development of the proposed open space corridor.

The Recreation Element calls for the expansion of Irvine Park through the construction of a new park at the Villa Park Dam. This park would lie outside of the present corporate City limits but like Irvine Park, would be readily accessible to Orange residents. Villa Park Basin is proposed to be a regional recreation facility with improvements similar to those found at Santiago Oaks Regional Park and Irvine Park.

Adjacent to Villa Park Basin and Irvine Park, the County would like to establish Weir Canyon Regional Park. According to the County's Recreation Element, Weir Canyon is recognized as "one of the most extensive oak forests in Orange County" and consequently, has been recommended for nomination to the National Register of Historic Places. (Reference 1, page REC-4-28) Weir Canyon Park would encompass several hundred acres of open space in the hills adjacent to the City.

The third proposed County park lies south of Orange at the Peter's Canyon Reservoir. This property and surrounding lands are owned by the Irvine Company. A portion of this park is proposed for annexation to the City of Orange.

As indicated above, the County proposes to establish a new hiking and riding trail within the Santiago Creek corridor. In addition, several miles of trails are planned through and around Orange to link up to the existing trail system. Figure OSC-8 indicates the general location of the new trail routes. The trails are described in the County General Plan Recreation Element as follows:

- ° Santiago Oaks Trail - Extends along the creek from Anaheim Hills Trail to Santiago Creek Trail for a distance of 0.6 miles, terminating at Santiago Oaks Regional Park.
- ° Santiago Creek Trail - Along Santiago Creek, Limestone Canyon and Santiago Canyon Road from Villa Park Road toward Mission Viejo for a distance of 16.6 miles.
- ° Weir Canyon Trail - To and along Weir Canyon from the Santa Ana River Trail at Featherly Park to the Santiago Creek Trail at Irvine Regional Park for about 7.6 miles.

Parks Needs Assessment

The NRPA park area standards described previously can be used to gauge the provision of park space Citywide against a nationally accepted average. The State Department of Finance estimates that as of January, 1987, the City of Orange had a resident population of 103,264. This figure yields the park acres per 1,000 residents ratios displayed in Table OSC-7.

As Table OSC-7 indicates, the City falls below the NRPA standards for mini-parks and neighborhood and community parks. Regional park space, however, exceeds the standard. These figures seem to indicate that Orange lacks local park space. The figures do not reflect the fact, however, that several school facilities provide recreation and open space areas, although the facilities are not included in the park area inventory.

Figure OSC-8 shows that several neighborhoods throughout the City do not lie within one-half mile of a park, which NRPA standards inciate is an appropriate service radius. However, most neighborhoods have ready access to school grounds. Areas not served by an existing or planned park include: the east side of Old Towne, north Orange, east of the Costa Mesa Freeway and north of Taft Avenue; and most of east Orange north of Chapman Avenue.

The City could readily expand its recreational open space resources by expanding its joint-use agreement with the school district to include several additional school facilities. Also, closed school

TABLE OSC-7
PARK AREA IN ACRES PER 1,000 POPULATION

Park Category	NRPA Standard (acres/1,000 residents)	City of Orange (acres/1,000 residents)
1. Mini-Parks None	0.25 - 0.5	0
2. Neighborhood Parks -Killefer -Shaffer -Yorba -El Modena -La Veta -Olive -Handy -Katella -Santiago Hills* -Nohl Hills*	1.0 - 2.0	0.61
3. Community Parks -Hart -Eisenhower -El Camino Real -Cerro Villa*	5.0 - 6.0	1.00
4. Regional Parks**	5.0 - 10.0	14.0

*Undeveloped park space.

**Includes wilderness areas.

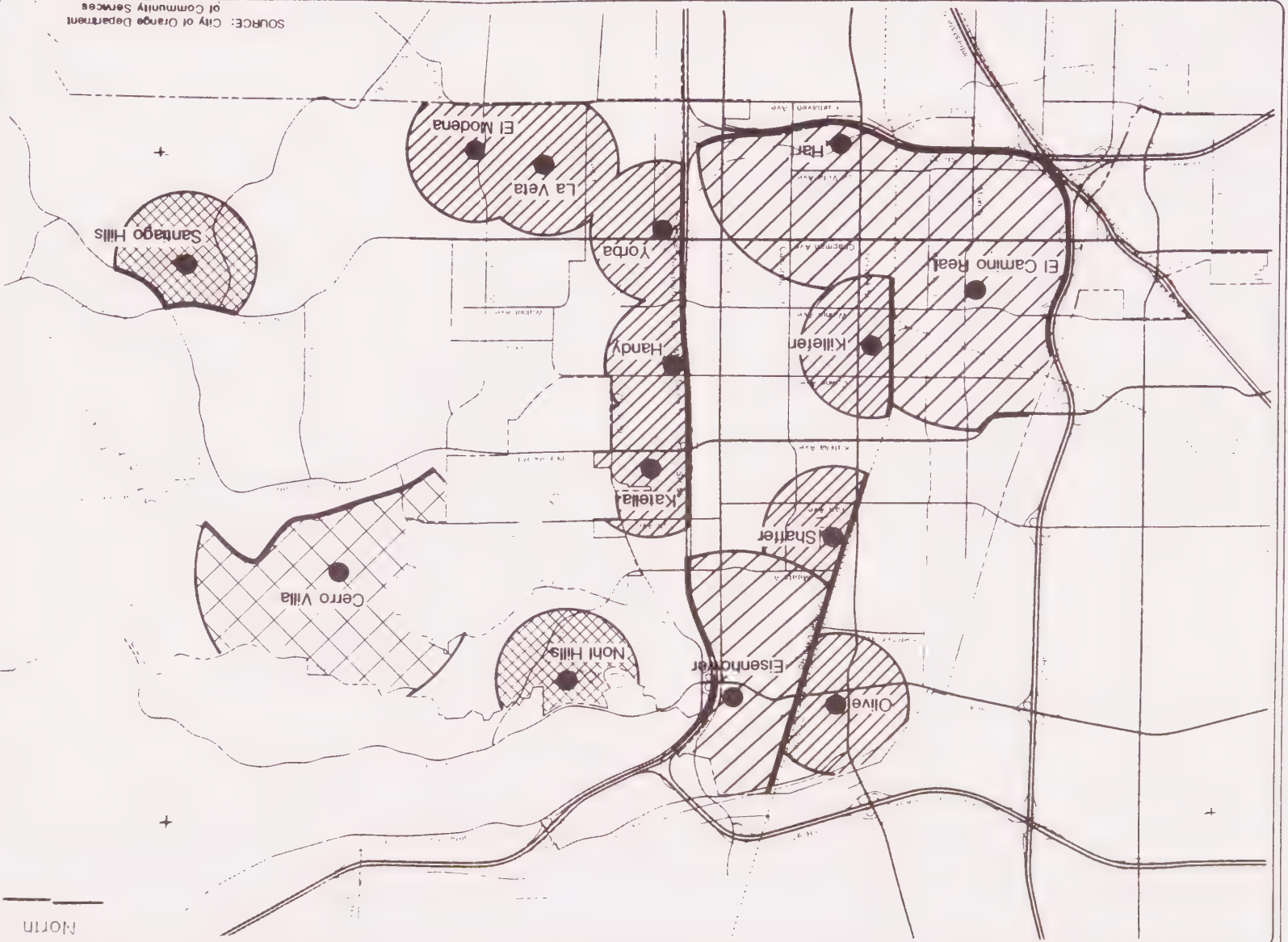


Figure OSC-8
Park and Recreation
Facility Service Areas

sites, such as Peralta Junior High on Meats Avenue, could be acquired by the City for recreational uses.

The need for additional recreation facilities appears to be more critical in the eastern half of the planning area.

The Department of Community Development collects fees from new residential development to acquire new recreation facilities and to finance programs. As of September, 1987, the fees were \$250 per unit for single family homes and \$150 per dwelling unit for multiple family residential projects. The Director of Community Services indicates that the fee amount does not accurately reflect the financial burden placed on recreation services by new development. Increased fees represent a potential source of income for expanded recreation programs and facilities and additional open space areas.

These fees are collected as development impact fees. If the City were instead to collect fees or acquire parkland as authorized by the Quimby Act, the Department might have more flexibility in assessing demand for park space and levying fees or in-lieu dedications accordingly.

Other Open Space Areas

Within the undeveloped hill areas of east Orange lie canyons and ridgelines which offer natural open space settings and spectacular vistas. Also, in the developed portions of the City, landscaped medians, utility easements and cemeteries provide welcome relief from the concrete expanse of the urban environment.

Santiago Canyon Road winds through a portion of the City which has been developed with large lot, equestrian-oriented residences and which also contains large tracts of undeveloped properties. Although denser urban development has occurred near Rancho Santiago Community college, the drive along Santiago Canyon Road still feels rural. Development in the hills to the east should retain this atmosphere by retaining major landforms such as ridgelines and hillslopes.

West of the Costa Mesa Freeway, the City contains no such open space corridors. However, open space features include landscaped roadway medians and the Southern California Edison utility easement. Plant nurseries use portions of the easement to grow stock, including Christmas trees.

A significant open space resource is a 127-acre open space easement which encompasses an entire hill west of Orange Park Acres. A private, non-profit organization dedicated the land to the County for the purpose of protecting the land from development. Several acres along Santiago Creek also fall under County ownership. Presently the area is undeveloped and provides visual open space which in the future may be developed with parkland, trails and urban uses.

The Orange County Water District uses abandoned gravel pits along Santiago Creek for groundwater recharge. Additional water resource open space areas in the City include Santiago Creek east and west of the Costa Mesa Freeway, Handy Creek, which runs above and below the ground from the Peters Canyon Reservoir through the Orange Park Acres area.

5.0 IMPLICATIONS FOR LAND USE PLANNING

Identified resources - either natural or cultural or recreational open space - cannot be preserved unless some means exists to protect them. Land use regulations provide the best mechanism to ensure resource conservation and preservation of significant historic and recreation resources.

Mineral Resource Zones

The State Public Resources Code contains clear direction on how general plans must address designated mineral resource zones. As indicated previously in this report, Section 2762 of the Code requires general plan policy to: 1) recognize the mineral resource information provided by the State; 2) assist in managing areas of statewide and regional significance, and 3) emphasize the conservation and development of identified deposits.

Both the Open Space and Conservation Element and Land Use Element, therefore, must articulate the City's policy regarding future uses of and on areas within the MRZ-2 zone. State law does not preclude the establishment of urban uses in designated resource areas. Rather, the City must justify its policy in the general plan, and future land use decisions must be consistent with that policy.

Historic Resources

Historic resource preservation requires strong cooperation among City agencies, community groups and property owners to ensure that historic preservation goals are achieved.

The first step toward preserving historic buildings, sites or districts involves officially recognizing the resources and establishing land use policy which will protect and preserve them. All significant historic resources should be clearly indicated graphically in both the Open Space and Conservation Element and the Land Use Element, and both elements should articulate relevant policies and objectives to ensure preservation of the resources. General plan policy may: 1) require specific plans to be prepared for historic districts; 2) designate historic overlays on the land use policy map and provide relevant land use guidelines; and/or 3)

require existing rehabilitation guidelines to be enforced or new guidelines prepared.

Recreation Resources

If the City wishes to maintain a higher ratio of park acres per 1,000 residents, additional parkland will need to be acquired over time. The land use policy map must indicate where future parks will be located.

6.0 REFERENCES

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Safety Element Technical Report



SAFETY ELEMENT
TECHNICAL REPORT

City of Orange
General Plan Update

November, 1987

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1.0 INTRODUCTION

The risks of upset in the event of a disaster can be reduced if known hazards are identified. Appropriate land use policy and emergency plans which minimize the exposure of residents to these hazards should then be adopted. The Safety Element Technical Report is concerned with both describing the hazards which affect Orange residents and the identification of City agencies and resources available to protect residents from large scale loss of lives or property in the event of a disaster.

In this report, safety hazards are divided into two general categories--natural environmental hazards and man-made hazards. Section 2.0 describes the natural hazards which could influence land use decisions, including:

- ° Earthquakes and related ground-shaking effects;
- ° Landslides, mudslides, rockfalls and soil creep;
- ° Liquefaction;
- ° Flooding due to natural causes or dam failure;
and
- ° Wildland fires.

Hazards present due to the activities of man are identified in Section 3.0. These hazards are:

- ° Accidental release of hazardous materials;
- ° Urban fires;
- ° Pipeline rupture; and
- ° Hazards related to abandoned landfills (e.g., methane gas release, differential settling).

Section 4.0 identifies the City agencies which provide emergency services and also describes existing emergency response plans.

2.0 ENVIRONMENTAL HAZARDS

Natural environmental forces and events such as landslides, earthquakes or floods may pose risks to life and property when urban uses encroach into areas subject to these and other natural hazards. Orange residents are exposed to four general categories of natural hazards. These categories include: seismic hazards, geologic hazards (other than seismic), flooding and wildland fires.

Seismic Hazards

Southern California is criss-crossed by a network of major regional faults and minor local faults. A fault is a fracture in the earth's crust along which movement has taken place. The earth may move laterally (strike-slip) or vertically (thrust or normal) along a fault.

Earthquakes are manifestations of fault activity. As the earth's crust shifts and changes, pressure may build up along a fault where two sections of the crust meet. The release of built-up stress produces ground vibrations which we experience as earthquakes.

Faults may be categorized generally as active, potentially active or inactive. The State General Plan Guidelines define an active fault as one that has moved recently and is likely to move again. For land use planning purposes, "recent" is considered to be from 11,000 years ago to the present. A potentially active fault is one which either has moved within the Quaternary Period before the Holocene Epoch (the last 2,000,000 to 11,000 years); or b) has been judged to be capable of ground rupture or shaking and therefore poses an unacceptable risk to structures. Inactive faults are those which show no evidence of movement in recent geologic time and no potential for movement in the relatively near future. (General Plan Guidelines, 1987)

Earthquake activity along an active fault can result in several phenomena which can damage structures and otherwise threaten human health and safety. Ground rupture may occur directly along a fault, resulting in severe damage to any structure or pipeline built directly across a fault. Ground shaking from

initial fault movement and subsequent aftershocks can severely damage unreinforced buildings and can result in widespread interior damage (e.g. broken windows, fallen and shattered objects) in any other structure. People can be hurt by objects falling inside their homes or objects falling outside.

Groundshaking may also result in landsliding, rock falls and liquefaction. Liquefaction occurs when seismic-induced ground shaking causes water-laden, cohesionless soils to form a quicksand-like condition below the ground surface. Structural damage may ensue as building foundations lose support. Liquefaction generally occurs in areas where groundwater lies within 30 feet of the ground surface and where poorly consolidated soils predominate.

The extent of damage which could result from an earthquake depends on many factors, including the location of the earthquake epicenter, earthquake magnitude, the structural soundness of buildings throughout the City, and the degree of general public preparedness for earthquakes.

Regional Faults - Although no known or suspected major, regional active faults traverse Orange, four faults do exist within 30 miles of the City. These faults are: 1) the Whittier-Elsinore Fault; 2) the Newport-Inglewood Fault; 3) the San Andreas Fault; and 4) the San Jacinto Fault. Figure S-1 indicates the generalized location of these geologic features.

The Whittier-Elsinore Fault, a northwest trending strike-slip fault, lies about four and one-half miles north of the Lincoln Avenue/Costa Mesa Freeway interchange. The fault hugs the base of the Santa Ana Mountains (Figure S-1). In the vicinity of Orange, this fault has not produced major earthquakes within historic times, although a number of temblors in the 3.0 to 4.5 Richter magnitude range have been measured. In September of 1987, a 6.1 earthquake occurred near this fault about 35 miles north of Orange, in the city of Whittier. Whittier and surrounding cities in Los Angeles County sustained noticeable damage, particularly to older homes and commercial buildings. Orange experienced a sizable jolt which rattled windows, shook objects inside buildings and caused some minor

structural damage. Geologic studies indicate that any portion of the Whittier-Elsinore Fault is capable of producing an earthquake up to 6.9 Richter magnitude, which could result in "severe" damage in Orange. (Morton et.al., 1976)

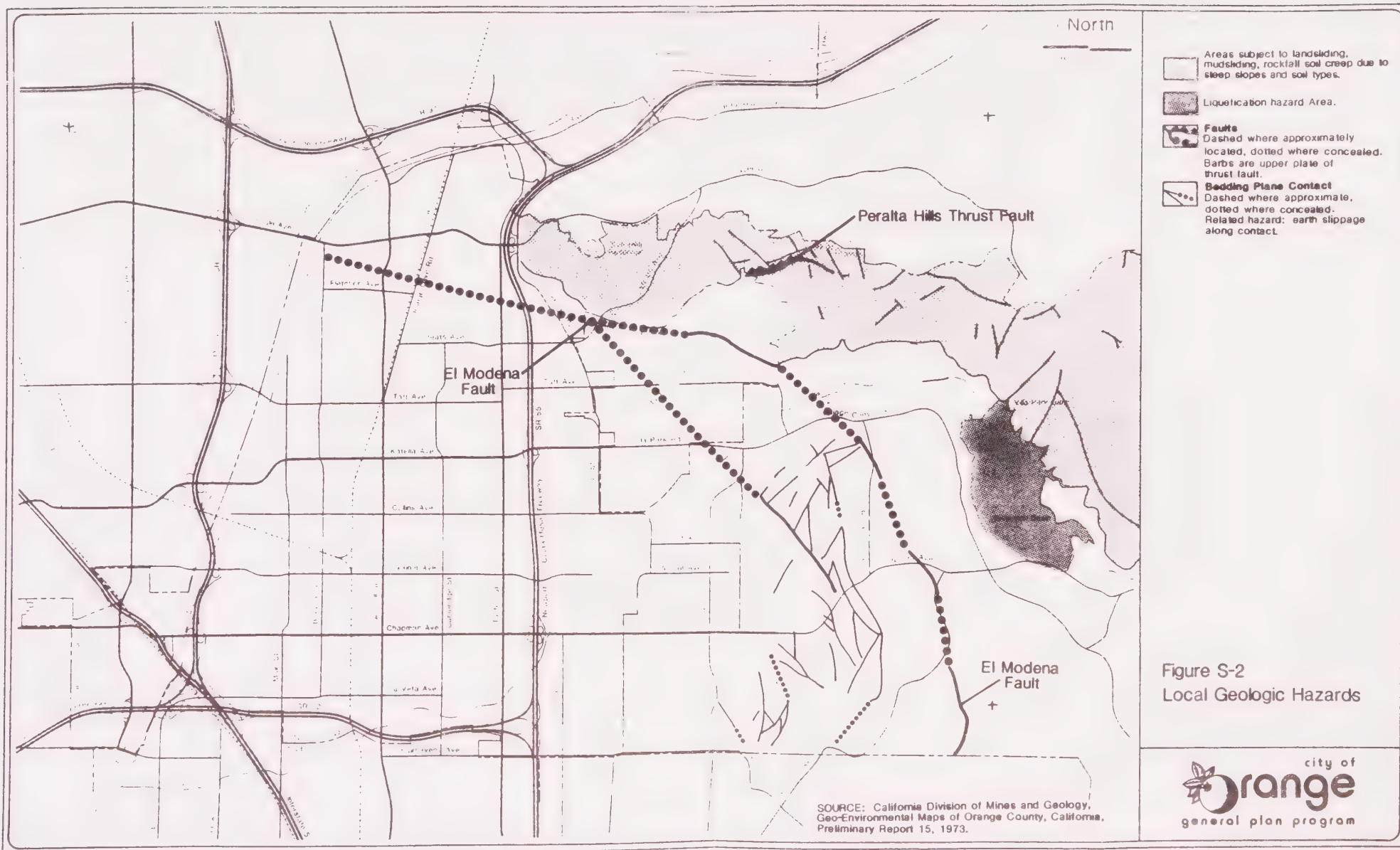
The Newport-Inglewood Fault, which roughly parallels the Pacific coast 17 miles southwest of Orange, historically has produced slightly stronger and more frequent earthquakes than nearby traces of the Whittier-Elsinore Fault. Several events measuring 4.3 Richter magnitude have been recorded. The Long Beach earthquake of 1933, which was centered offshore from Long Beach, measured 6.3. Based on historic record, geologists estimate that the maximum probable earthquake along this fault would be on the order of 6.3 to 6.5 Richter magnitude, or slightly larger than the 1933 Long Beach temblor.

The San Andreas Fault is thought to be capable of producing an earthquake of over 8.0, an event which would cause widespread upset throughout Southern California. The closest trace of this fault lies approximately 35 miles northeast of Orange. No movement has occurred along the central portion of the San Andreas Fault since 1857. Geologists estimate the recurrence interval of major quakes along the central portion to be 126 to 300 years. As each year passes without a major earthquake occurring along this section of the fault, probability of such an occurrence increases the following year.

In Southern California, increased attention has been focused on preparing for a major San Andreas-induced earthquake. Orange should expect to experience strong ground shaking and resultant damage to older structures if and when a major episode occurs.

The San Jacinto Fault is a major branch of the San Andreas Fault but is not considered capable of producing earthquakes greater than magnitude 8.0. (Morton, et.al., 1976).

Local Faults - One sub-regional fault and numerous small faults may be found in and along the hills of east Orange. The El Modena Fault traverses the base of the Peralta Hills, as indicated on Figure S-2. The smaller faults, which mark the contact points of geologic bedding planes, criss-cross the hills.



Earth may have a tendency to slide along these smaller fault planes due to gravity forces, but the faults are not considered capable of producing earthquakes. Hazards associated with these faults include minor earth slippage and larger scale landsliding.

The El Modena Fault extends from the Santa Ana River eastward toward Santiago Creek along the base of the Peralta Hills. The Peralta thrust fault (Figure S-2) may be structurally related to the El Modena Fault. (Morton, 1976) Geologists debate whether the El Modena Fault and related faults should be considered active. A fault evaluation report prepared by the California Division of Mines and Geology in 1977 (supplemented in 1978) concludes that the El Modena Fault "appears to be inactive." (Hart, 1978)

However, the report also indicates that four minor seismic events have been recorded just north of the western end of the fault and "could have occurred on the El Modena (F)ault or along the Peralta thrust fault or related small faults that lie within a few kilometers to the north of the western part of the El Modena Fault." (Smith, 1977)

A paper published in the January 1982 issue of California Geology magazine concludes that seismic refraction data indicate strongly that movement along the El Modena Fault has occurred during the Holocene time and therefore "the fault should be considered as active." (Ryan, et. al., 1982) However, the California Division of Mines and Geology has not recognized the fault as active and consequently, has not designated an Alquist-Priolo Special Studies Zone along the fault. Future studies by Mines and Geology will determine the status of this fault. Land use policy should recognize that the El Modena Fault is a surface fault which may be active, and fault rupture as well as ground shaking may impact land uses located on or near the fault.

The smaller faults which cut across the Peralta Hills have been responsible for building damage due to earth slippage. Land use decisions should recognize the constraints these faults place on development.

Hazards Related to Seismic Activity - As indicated above, seismic-induced ground shaking can result in secondary effects such as landsliding, rockfall and liquefaction. Landsliding and rockfall are discussed below under the "Geologic Hazards" heading. Only a limited portion of the City is subject to liquefaction hazards. Maps supplied by the California Division of Mines and Geology indicate that the soils beneath Villa Park Reservoir may liquefy following an earthquake. (Figure S-2)

One additional seismic-related hazard is flooding due to seiches or, more significantly, dam failure. A seiche is an oscillation, or a wave, in a land-locked body of water which is caused by ground shaking. An earthquake may produce vibrations which cause water to slosh back and forth in a lake or reservoir, such as water may do in a bathtub. If the ground vibrations are strong enough or occur at a resonant frequency, water may spill over a dam in a reservoir, flooding areas below the dam. In Orange, seiche effects could occur at the Villa Park Reservoir or at Irvine Lake. Affected flood areas are indicated on Figure S-3 and are discussed in a subsequent section of this report.

Geologic Hazards

Landslides, rockfalls and liquefaction are other environmental hazards related to seismic activity. However, landsliding and other forms of mass wasting can occur in the absence of an earthquake. Additional geologic hazards unrelated to seismicity include mudslides, soil creep and erosion.

Landsliding, mudsliding and rockfall have occurred extensively throughout the hills of east Orange. These phenomena result when slopes become unstable and give way to gravity forces. Structures located on the unstable land masses may be carried down a hillside, and structures in the pathway of a moving mass or falling rocks can sustain extensive damage in the event of such earth failure. Figure S-2 indicates the hillside areas where steep slopes, soil composition, erosional factors such as wind and water, as well as the activities of man, continue to create the potential for hazardous earth failure. By identifying these areas and recognizing the dangers associated with them, the City can formulate land use policy which minimizes the exposure of people and structures to landslide, mudslide and rockslide prone areas.

Figure S-2 also delineates hillside areas subject to a condition known as soil creep. Unlike landsliding or mudsliding, which involve sudden earth movement at rates approaching tens of miles per hour, soil creep is a slow process which can be measured in inches of earth movement per year. Depending on the moisture content of the soil, the creep may be continuous or intermittent. The condition does not present a real threat to human safety, but if undetected, the process can adversely affect utility lines, roadways, structures not anchored to bedrock, fences and the like. Soil creep may also lead to mud-debris flows and shallow bedrock landslides. (Morton et.al., 1976)

Flood Hazards

In Orange, flooding could occur as a result of either: a) the overload of regional or local flood control facilities; or b) dam failure and subsequent inundation of downstream properties.

Flooding and the 100-Year Flood

Flood hazards are most often defined in relation to a flooding event referred to as the "100-year flood." As its name implies, the 100-year flood is considered to be the flood which would result from the heaviest rainfall in a 100 year period. The flood may occur during any year within the 100 year time frame, or it may occur more than once in 100 years. This flood is considered a severe flood, but for land use and civil engineering planning purposes, its effects can be reasonably predicted and therefore reasonably mitigated. (Huntington Beach, 1981.)

The National Flood Insurance Program, which provides flood insurance to participating cities and counties, is intended to cover, at a minimum, all land affected by the 100-year flood. To receive relief and assistance for flood damage, participating agencies must recognize 100-year flood boundaries as indicated on the Federal Flood Insurance Rate Maps (FIRM) and must adopt and enforce appropriate land use policy for these areas. Orange has participated in the program since 1987.

Figure S-3 delineates the 100-year flood limits as indicated on the 1982 FIRM for the City of Orange and areas of the County located within the General Plan planning area. The figure indicates that

100-year storm flows generally are contained within natural watercourses and concrete flood control channels. The natural channels are the Santa Ana River and Santiago Creek.

Both the Army Corps of Engineers and the Orange County Flood Control District have proposed and installed new flood control features along both the Santa Ana River and Santiago Creek. These features substantially reduce the area subject to inundation during the 100-year flood. The Federal Emergency Management Agency is currently (1988) reviewing data submitted by the Corps and County Flood Control for the purpose of revising boundaries on the 1982 FIRMs. The conditions described in the following paragraphs are based on 1982 FIRM data.

Santa Ana River - The Santa Ana River is a major flood control facility which services portions of San Bernardino, Riverside and Orange Counties. The 90-mile river originates in the San Bernardino Mountains, and as it flows to the Pacific Ocean, the river collects run-off from a 3,200 square mile watershed.

In 1941, the Army Corps of Engineers completed major flood control improvements along the river which were designed to control floods resulting from anticipated future development. Improvements included construction of Prado Dam and Reservoir and concrete-lined river banks. However, the level of development which has occurred and continues to occur within the watershed far exceeds the level anticipated in the 1930s. Consequently, the Santa Ana River cannot contain the 100-year flood. As of 1986, the Corps completed the first phase of a new master plan for the river with design features to control 175-year storm flows. The U.S. Congress has authorized the improvement plans, and the Corps anticipates construction to begin in 1990 or 1991.

In the absence of the improvements, major portions of west Orange will continue to be exposed to 100-year flood hazards. As Figure S-3 shows, virtually all properties west of the river lie within the 100-year flood floodplain. Properties east of the river receive protection via a series of City and County flood control improvements. These flood control facilities include:

- The Fletcher Retarding Basin, located at Fletcher Avenue and American Way;
- Fletcher channel, which connects Fletcher Basin to the Santa Ana River;
- Collins channel, which roughly parallels the Atchison, Topeka and Santa Fe railroad mainline; and
- Bitterbush channel.

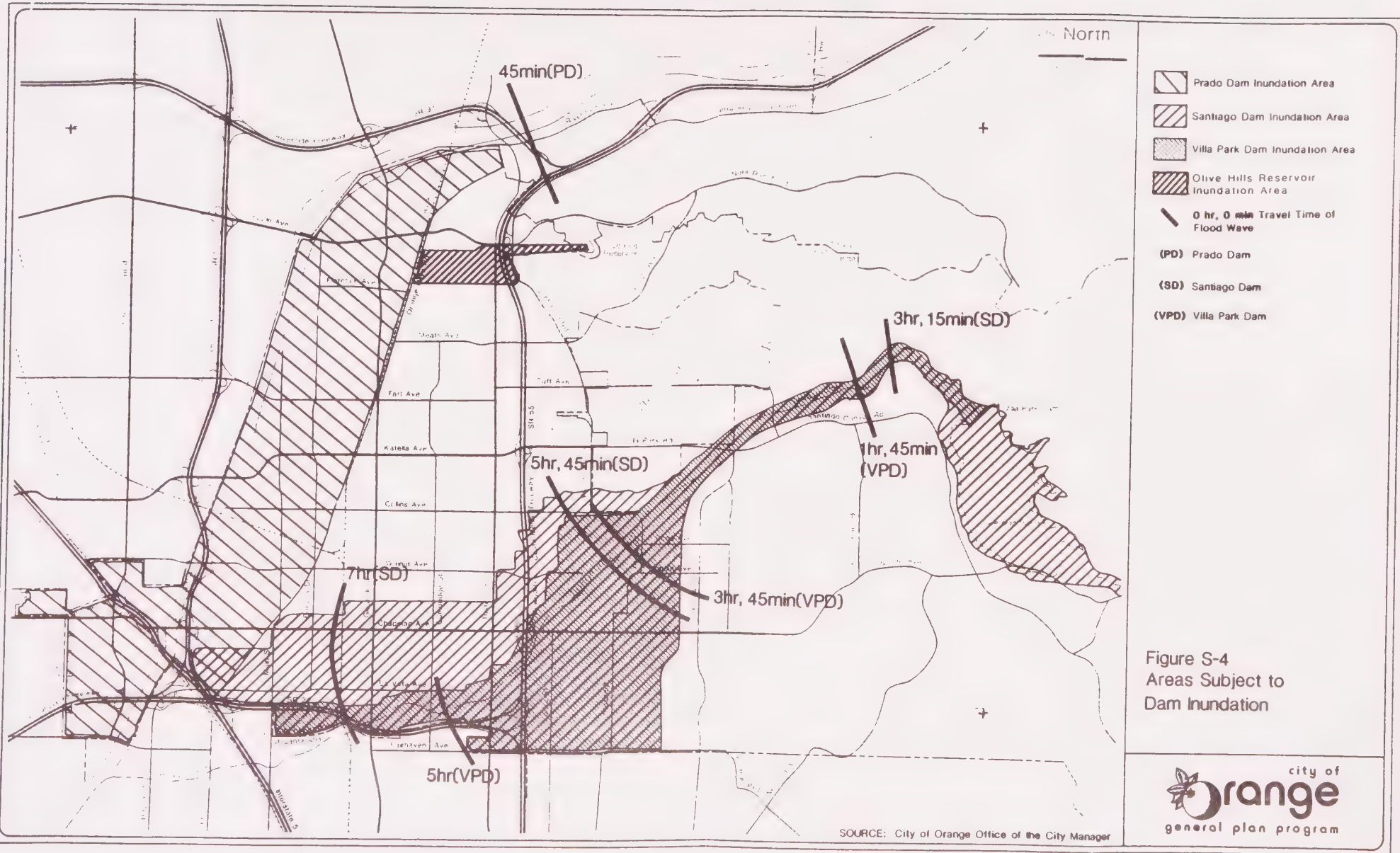
These facilities are indicated on Figure S-3.

Santiago Creek - Properties along Santiago Creek are fairly well protected from 100-year flood hazards. The 100-year flood boundaries displayed on Figure S-3 generally conform to the creek floodway and the abandoned gravel pits which now serve vital flood control and groundwater recharge functions. However, several residential properties located south of the creek and east of Rancho Santiago Boulevard are subject to flooding. Also, along the lower reaches of the creek in south Orange, the shallow creek channel leads to flooding of Santiago golf course and the Hart Park parking lot. In fact, the Hart Park parking lot lies within the floodway, and consequently, it is flooded even during moderate rainstorms.

Dam Inundation

Three major flood control reservoirs lie upstream from Orange. In the event of dam failure at any of these three facilities, extensive flood damage could result. The three facilities of concern include: 1) Prado Dam and Reservoir; 2) Santiago Dam and Irvine Lake; and 3) Villa Park Dam and Reservoir.

Prado Dam - Prado Dam and Reservoir, located approximately 20 miles upstream from Orange near the city of Corona, serve as the major water retention facilities for the Santa Ana River watershed. The Army Corps of Engineers completed construction of the concrete-lined earthen dam in 1941. By 1991, the Corps anticipates that construction will begin on dam and Santa Ana River channel improvements which will provide downstream properties with 175-year flood protection.



Inundation maps prepared by the Los Angeles District of the Corps indicate that failure of Prado Dam could result in the flooding of all properties generally located west of the Atchison, Topeka and Santa Fe railroad mainline, as shown on Figure S-4. Flood waters could reach the northern City limit approximately 45 minutes after initial dam failure. At Orange, flood depths could range from nine to 23 feet, with velocities ranging from five to 14 feet per second. (City of Orange Emergency Plan, 1984)

Santiago Dam - Santiago Dam and Irvine Lake lie immediately east of Orange, just upstream from Irvine Regional Park and Villa Park Reservoir. Santiago Dam is an earth-filled gravity dam. The lake impounded behind the dam has the primary purpose of water conservation, but the facility also serves valuable flood control and recreation functions.

Failure of Santiago Dam has the potential to affect properties located east and west of the Costa Mesa Freeway. As Figure S-4 indicates, flood waters would flow through Irvine Park into Villa Park Reservoir, over Villa Park Dam and along the Santiago Creek flood plain. At about Bond Avenue, waters would begin to spread out and cover urbanized portions of the City, including a large section of Old Towne.

Villa Park Reservoir, Santiago Creek and the abandoned gravel pits along the creek should serve to slow flood waters substantially, allowing residents to evacuate the area prior to potential inundation. Engineering studies prepared for the City in 1973 indicate that reservoir overflow may not reach beyond Bond Avenue until five hours and 45 minutes after dam failure. Figure S-4 outlines the estimated travel time of flood waves at various locations along the flood path.

Villa Park Dam - Villa Park Dam is a earthfill structure constructed for the primary purpose of flood control. Flood waters from Villa Park Reservoir would affect approximately the same area east of the Costa Mesa Freeway as floodwaters originating from Santiago Reservoir. However, flood waves would reach urbanized areas faster, as indicated by the flood wave travel times on Figure S-4. West of the freeway, only those portions of Old Towne south of La Veta Avenue may be inundated.

Olive Reservoir - Inundation maps have not been prepared for Olive Reservoir, which is located near the northern City boundary in Anaheim (Figure S-4). Failure of this reservoir could result in the flooding of canyons and some residential subdivisions south of the reservoir.

Wildland Fires

The brush-covered hills of east Orange present a constant threat of wildland fire, especially during the hot, dry summer months when warm Santa Ana winds can whip fires over hills and through canyons toward urbanized areas. In the undeveloped hills, wildland fires can remove vegetation which provides habitat for wildlife and serves critical erosion control functions in watershed areas. Wildland fires may also threaten homesites in the outlying areas of the City. In 1982, a fire near Cerro Villa Park destroyed several homes as well as many acres of vegetation.

Figure S-5 delineates those areas subject to wildland fire hazards. In developed areas, hazards can be reduced by clearing brush from around homes and by establishing fire breaks across ridgelines and other areas as appropriate.

3.0 MAN-MADE HAZARDS

Hazardous Materials The ongoing use, production and transportation of hazardous materials in and through the City pose constant and real threats to the safety of the community. Accidental release of a hazardous substance into the urban environment has the potential to cause localized or widespread upset.

In recognition of the dangers associated with keeping hazardous substances in urbanized areas, the State legislature has enacted several laws regulating the use and transport of identified hazardous materials. In particular, Assembly Bill 2185 requires all businesses using these materials to inform local government agencies of the types and quantities of materials stored onsite. This disclosure enables emergency response agencies to respond quickly and appropriately to accidents involving dangerous substances.

In Orange, the City Fire Department is responsible for maintaining the list of businesses using hazardous materials and the types of materials used. In the event of a fire or other accident involving these businesses, City firemen are the first emergency personnel to respond. The Orange County Hazardous Materials (Haz Mat) Team is called in as necessary.

Businesses using hazardous materials are concentrated in the City's industrial district. Therefore, a minimum number of residential neighborhoods are exposed directly to related dangers. The City will continue to use zoning and other land use regulation techniques to separate sensitive uses such as residences and schools from potentially harmful industrial and commercial uses.

However, accidents which result in chemical clouds or release of hazardous materials into public water or sewer systems may affect outlying neighborhoods or the community at large. Depending upon the scale of the accident, large segments of the residential and the business populations may need to be evacuated quickly for extended periods of time. Effective emergency planning with regard to hazardous materials, therefore, requires the concentrated efforts of the City Fire and Police Department as well as other public safety officials and private organizations such as the Red Cross.

Urban Fires

Urban fires have the potential for destroying millions of dollars worth of property and endangering persons living or working in unsafe, fireprone structures.

Fire dangers are most severe in the City's industrial district, where many businesses store a multitude of flammable materials. Although strict fire codes regulate the use and storage of these materials, carelessness and human error can cause a blaze to begin and spread quickly.

Rapid spread of fires may be problematic in Old Towne where buildings have been constructed close together without the benefit of modern fire protection techniques. The risk of widespread damage is also a concern in older multiple-family units and in small lot, single-family neighborhoods. Newer construction generally is provided with a higher degree of fire protection.

The community-wide level of fire protection may be described in terms of an ISO rating. The Insurance Services Office (ISO) is a private insurance service rating organization which provides a protection class ratings for jurisdictions throughout the nation. This rating system, based on a one to ten scale, with one being the highest rating, indicates the level of fire protection available in a jurisdiction relative to other jurisdictions. The rating accounts for such variables as number of fire stations and fire personnel, City-wide fireflows and available fire prevention programs.

As of September 1987, Orange had a Class 3 rating, which means that the City is afforded a relatively high degree of fire protection.

High Pressure Pipelines

A total of nine major high-pressure pipelines pass through Orange. These pipelines transport natural gas and petroleum products. Public safety hazards related to pipe rupture include liquid material spills, fires, release of dangerous gases and potential groundwater contamination. State and Federal agencies are responsible for regulating the operators of these facilities.

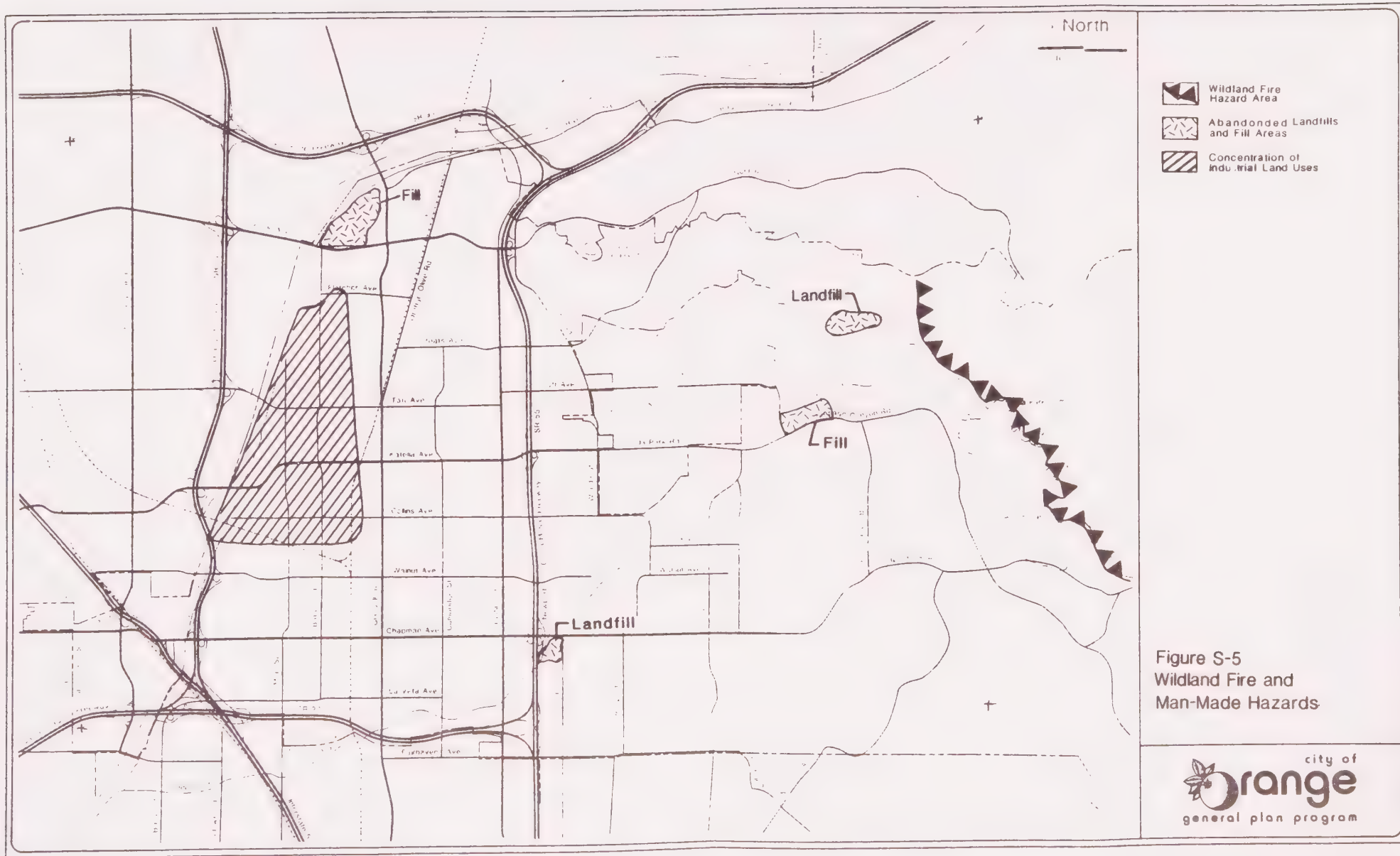
Landfill Sites and Fill Areas

Before Orange was urbanized as extensively as it is today, outlying properties were used for formally and informally as dump sites. In particular, the pits created by aggregate mining activities along Santiago Creek proved to be suitable places to dump urban waste and other fill material.

The City Planning Department has identified five former landfill sites and fill areas within the planning area, as indicated on Figure S-5. As of September 1987, studies had not been performed to determine the contents of the sites.

Abandoned landfills at the Cerro Villa Park site will require special consideration in future land use and planning decisions. Increasingly, landfill sites are being reused for urban or open space development. This redevelopment requires solving problems and potential hazards such as settling of the ground surface, methane gas release, seepage of toxins into groundwater supplies and exposure of people to harmful substances. Problems associated with fill areas include differential settling and slippage.

Existing technology enables dump sites to be investigated and if necessary, cleaned, prior to the development of a new use onsite. Clean-up can be very expensive, and often a high-income generating land use needs to be constructed onsite to recover clean-up costs. These factors must be considered when planning land uses for landfill sites.



4.0 EMERGENCY RESPONSE AND PLANNING

In the event of either a natural disaster or an accident resulting from man's actions, the risks to life and property can be greatly reduced if the community responds quickly and appropriately to the incident. Public agencies, private organizations and Orange residents should all be prepared for any type of disaster.

Emergency Response

The two agencies responsible for primary emergency response in Orange are the City Fire Department and the City Police Department. In addition, the City maintains mutual aid agreements with surrounding jurisdictions which enables other fire agencies to respond to major incidents.

The City has automatic and mutual aid agreements with the cities of Anaheim and Garden Grove and with the Orange County fire department. "Automatic" aid means that fire personnel from Anaheim, Garden Grove or the County may respond to any accident or emergency in Orange without an official request for aid from City personnel. The City also participates in the County-wide mutual aid program. In the event of a large scale accident, City staff may call on fire agencies from other cities throughout Orange County for assistance.

Fire Protection - The City of Orange Fire Department operates seven fire stations throughout the City, located as shown on Figure S-6. The equipment and personnel at each station is described in Table S-1. In addition, a joint fire/police substation operates within the Irvine Company properties in East Orange. Also, three County fire stations are located in Orange. Locations are indicated on Figure S-6.

The Fire Department responds to emergency fire and medical calls. Department staff indicates that the average incident response time is three to five minutes, or slightly longer in outlying areas of the City.

In the event of a fire or other emergency situation involving hazardous materials, the City can call on the County Hazardous Materials (Haz Mat) Response Team for assistance. The Fire Department maintains files indicating the location and quantity of all hazardous materials stored at business sites throughout the City.

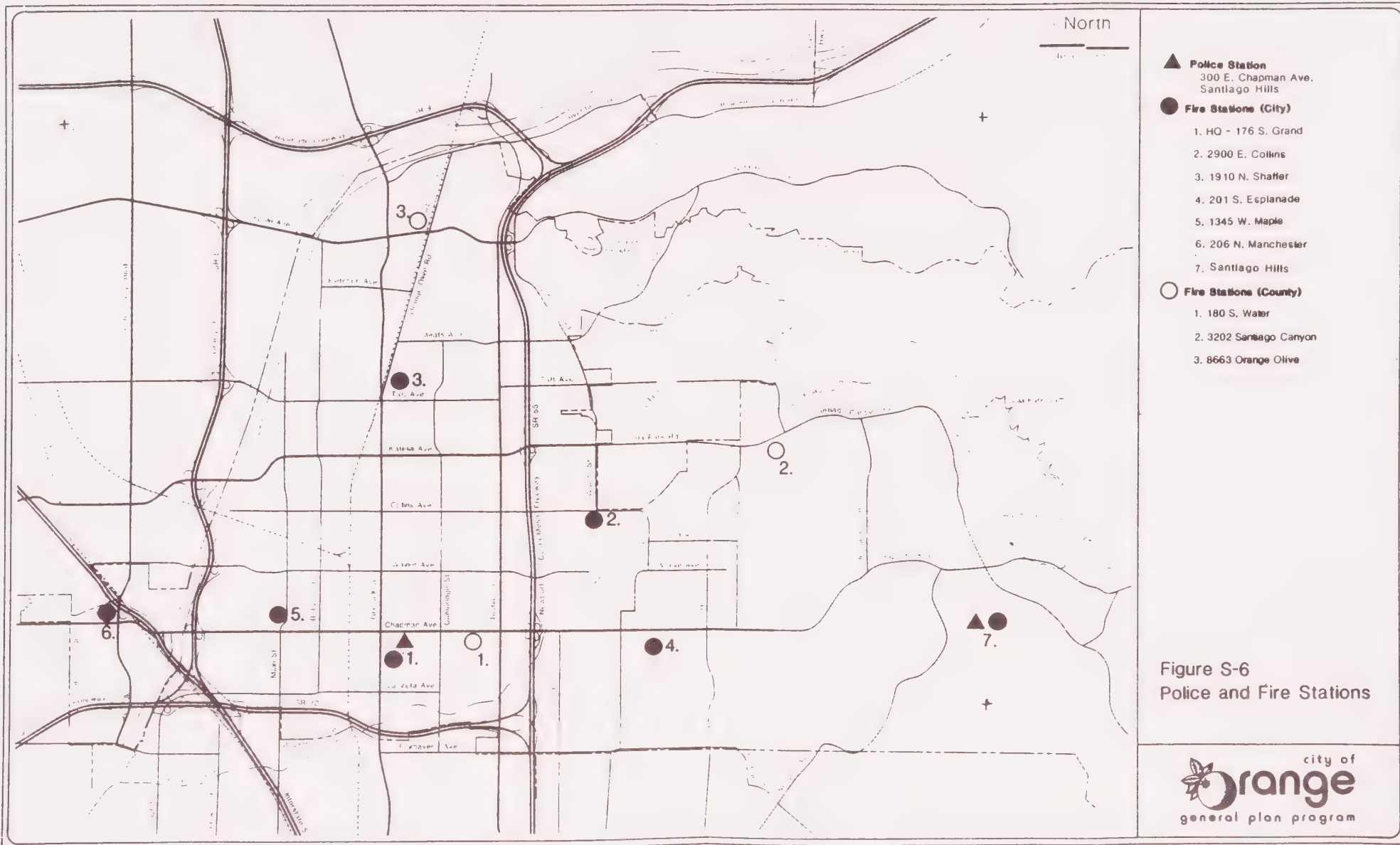


TABLE S-1
FIRE DEPARTMENT EQUIPMENT AND EMERGENCY RESPONSE PERSONNEL
OCTOBER 1987

Station	Address	Equipment	Personnel (per shift)
HQ	176 S. Grand	°1 Engine with paramedic capabilities °1 Truck	°4 Firemen °4 Firemen °1 Battalion chief
2	2900 E. Collins	1 Engine	3 Firemen
3	1910 N. Shaffer	°1 Engine °1 Paramedic Truck	°3 Firemen °2 Paramedics
4	201 S. Esplanade	1 Engine	3 Firemen
5	1345 W. Maple	°1 Engine °1 Truck	°3 Firemen °3 Firemen
6	206 N. Manchester	1 Engine	3 Firemen
7	7939 Santiago Canyon	1 Engine	3 Firemen
Totals		°7 Engines °2 Trucks °1 Paramedic	32 Personnel

Source: City of Orange Fire Department

Police Protection

Orange maintains its own police force with headquarter offices located at City Hall. A substation is planned for the eastern portion of the City.

As of October 1987, the Police Department employed 190 total police personnel, including 134 sworn officers and 56 non-sworn officers. Fifty-eight (58) officers were assigned to patrol duty (squad car or foot patrol), and the detective staff consisted of 33 officers. The traffic division employed three civilian accident investigators, two civilian parking enforcement personnel, 11 motor officers and one motor sergeant.

According to department staff, the average response time for non-emergency calls is 13 minutes and for emergency calls, 3.3 minutes.

Emergency Preparedness Planning

As indicated above, proper emergency preparedness planning can reduce the risk of large-scale panic and loss of life and property in the event of any accident or disaster. Emergency planning involves three main components: 1) hazards identification and risk assessment; 2) hazards mitigation; and 3) emergency response and action.

The previous sections of this report identify both the natural and man-made hazards affecting Orange residents. These hazards are - earthquake-induced ground shaking, landsliding, rockfall, liquefaction, flooding, dam inundation, wildland fires, release of hazardous materials and urban fires.

Risk Assessment - To better understand how these hazards affect emergency response and planning, it is first necessary to understand the concept of "risk." The Council on Intergovernmental Relations separates risk into three categories:

Acceptable Risk: The level of risk below which no specific governmental action is deemed necessary or appropriate;

Unacceptable Risk: The level of risk above which specific action by the government is deemed necessary to protect lives and property; and

Avoidable Risk: Risk which is unnecessary because individual or public goals may be achieved by other means at the same cost or less than the total cost.

Generally, the level or scope of risk will dictate the appropriate emergency response level by government agencies. Table S-2 indicates the scope of risk associated with the various hazards described above and also indicates the appropriate level of response to an emergency situation brought about by any of the hazards.

The three levels of response outlined in Table S-2 are based on the severity of a given situation and the availability of local resources to respond to an emergency. The State Office of Emergency Services (OES) defines the three levels of peacetime response as follows:

Level 1: A minor to moderate incident wherein local resources are adequate to deal with the current emergency.

Level 2: A moderate to severe emergency where local resources are not adequate to deal with the emergency, and mutual aid would be required on a regional or statewide basis.

Level 3: A major disaster where local resources are overwhelmed by the magnitude of the disaster, and State and Federal assistance are required.

Hazards Mitigation - Hazards mitigation is concerned with reducing or eliminating the potential hardship and loss resulting from future disasters. To be really effective, mitigation should occur in anticipation of an accident or disaster. For example, in recognition of landslide hazards in the hillsides, the City may adopt land use policy which minimizes the number of future residential units in landslide prone areas, thereby reducing the exposure of life and property to landslide hazards. With regard to reducing risks related to man-made hazards, the City may require hazardous waste producers or users to locate away from residential areas. Also, by maintaining a list of the types and quantities of hazardous materials stored at various locations, the City may respond appropriately to a fire or chemical spill, evacuating people as necessary to reduce the magnitude of the disaster.

TABLE S-2
ENVIRONMENTAL RISK ASSESSMENT FRAMEWORK

Environmental Hazard	Potential of Occurrence			Level of Risk			Emergency Response Level		
	Low	Medium	High	Acceptable	Unacceptable	Avoidable	I	II	III
Earthquake									
Surface Rupture	°				°			°	
Ground Shaking			°		°				°
Liquefaction	°					°		°	
Slope Failure		°				°	°		
Dam Failure	°					°			°
Landslide		°				°	°		
Mudslide		°				°	°		
Rockfall		°				°	°		
Fire									
Industrial		°				°	°	°	
Pipeline		°				°	°	°	
Highrise		°				°	°	°	
Wildland			°		°		°	°	
Flooding									
100-Year			°			°			°
Dam Inundation	°					°			°
Chemical Contamination									
Roadspill		°			°			°	
Airborne		°				°		°	
Subsurface		°				°			°
Radiological		°				°			°

Emergency Response and Action - In an emergency situation, public officials and staff, as well as City residents, should be prepared to take appropriate, pre-determined actions which may reduce the loss of life and property.

The City's Emergency Plan, adopted in August of 1984, outlines the emergency response responsibilities of City staff and officials for both wartime and major peacetime disasters. The plan indicates step-by-step response procedures for a variety of disasters, focusing on those most likely to affect orange residents (e.g. flooding, earthquakes, major accidents). In fact, the plan contains separate earthquake and flood contingency plans which provide detailed descriptions of public agency and staff responsibilities. These plans also indicate emergency evacuation routes and public assembly areas.

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Noise Element Technical Report



NOISE ELEMENT
TECHNICAL REPORT

February 1988

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1.0 INTRODUCTION

Why does the general plan contain a noise element? What is the relationship between noise and the long-range land use planning goals of the City?

Noise plays a very definite role in the land use planning process. Studies published by the federal government document the adverse effects excessive noise can have on physical and mental health. The purpose of the noise element technical report is to identify excessive noise sources in Orange so that land use policy may be directed toward protecting residents from potentially disturbing and harmful noise sources.

By nature, noise is a much more technical subject than the other issues addressed in the general plan. State general plan requirements call for community noise (sound) levels to be expressed in terms that are very technical and often difficult for the lay person to understand. However, a major focus of the Noise Element Technical Report is to provide the public with a clear and concise explanation of the characteristics, effects and regulation of noise. Section 2.0 of this report describes the characteristics of sound and how sounds affect people. Section 3.0 describes the relationship between noise and land use and development. Section 4.0 identifies sources of noise in the community and indicates the location of noise sensitive land uses. Section 5.0 discusses the results of community noise measurements and indicates how the existing noise environment may influence land use planning.

State Requirements

As indicated above, the State general plan guidelines are very specific with regard to the content of general plan noise elements. A major emphasis of these requirements is to provide a description of the existing noise environment. For example, the element must identify noise levels from the following sources:

- ° Highways and freeways;
- ° Primary arterials and major local streets;
- ° Passenger and freight on-line railroad operations;
- ° Ground rapid-transit systems;
- ° Commercial and military aircraft operations;
- ° Local industrial plants; and
- ° Other identified community noise sources.

Noise levels must be described in terms of a community noise equivalent level (CNEL) or day-night average level (Ldn). These terms are described in Section 2.0 of this technical report. Also, the community noise environment must be depicted on a map. Noise levels are mapped using

contour lines that indicate a given level of noise along the entire length of the line. Noise contours are depicted on maps in much the same way as elevation contours are shown on topographical maps. Figure N-7 in this Technical Report uses noise contours to describe the existing noise environment in the City.

2.0 CHARACTERISTICS OF SOUND

Noise Measurement

Noise and other forms of sound are produced when an action (a clap of the hands, a running engine) causes air pressure to vibrate in all directions around a noise source. When people hear sounds, they are actually detecting the changes in air pressure on their eardrums. This action is analagous to throwing a stone into a pond. The stone produce waves, or vibrations, which are carried to the edge of the pond.

A sound is anything that is or may be heard, whereas noise may be described as unwanted sound. Because the characteristics of sound are difficult to describe by a single unit of measurement, the standard unit describes only one aspect of sound - its level of loudness. This standard unit is the decibel, abbreviated as dB.

The Decibel - The decibel measures the one time occurrence of a particular sound. The decibel scale is designed so that an increase on the scale represents a tenfold (logarithmic) increase in sound energy and an approximate doubling of perceived loudness. For example, a kitchen dishwasher may produce a sound level of 60 dBA (relatively quiet), and a garbage disposal may produce sounds approaching 80 dBA (fairly loud). The eardrum can rupture at 140 dB, while 10 dB is generally considered to be the lower threshold of hearing. Table N-1 describes and compares the relative loudness of various noise sources.

Table N-1 indicates levels of noise measured in terms of "dBA." The A-weighted decibel scale corrects the standard decibel scale to account for the fact that the human ear is not equally sensitive to sound at all frequencies. The A-weighted scale discriminates against frequencies in a manner similar to the human ear.

Other Measures of Noise - Additional units of measurement have been developed to evaluate the longer term characteristics of sound. The equivalent noise level (Leq), the community noise equivalent level (CNEL) and the day-night level (Ldn) are the measurements commonly used in California. These measurements represent an average of all measured noise levels obtained over a specified period of time.

For example, the Leq is the average of the sound energy level for a one-hour period, whereas the CNEL measures sound over a 24-hour time frame. Both the CNEL and the Ldn are is based on 24 one-hour Leq measurements which are weighted to account for more sensitive periods of noise perception. That is, the late evening and early morning hours (between 10:00 p.m.

(A- Scale Weighted Sound Levels)

dB(A) ²	OVER-ALL LEVEL (Sound Pressure Level Approx. 0.0002 Microbar)	COMMUNITY (Outdoor)	HOME OR INDUSTRY (Indoor)	LOUDNESS (Human Judgment of Different Sound Levels)
130	UNCOMFORTABLY LOUD	Military Jet Aircraft Take-Off With After-Burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121) ^a	120 dB(A) 32 Times As Loud
120		Turbo-Fan Aircraft @ Take-Off Power @ 200 Ft. (118) ^a	Riveting Machine (110) Rock-N-Roll Band (108-114)	110 dB(A) 16 Times As Loud
110	VERY LOUD	Jet Flyover @ 1000 Ft. (103) Boeing 707, DC-8 @ 6080 Ft. Before Landing (106) ^a Bell J-2A Helicopter @ 100 Ft. (100) ^a		100 dB(A) 8 Times As Loud
100		Power Mower (96) Boeing 737, DC-9 @ 6080 Ft. Before Landing (97) ^a Motorcycle @ 25 Ft. (90)	Newspaper Press (97)	90 dB(A) 4 Times As Loud
90	MODERATELY LOUD	Car Wash @ 20 Ft. (89) ^a Prop. Plane Flyover @ 1000 Ft. (88) Diesel Truck, 40 MPH @ 50 Ft. (84) Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80 dB(A) 2 Times As Loud
80		High Urban Ambient Sound (80) Passenger Car, 65 MPH @ 25 Ft. (77) Freeway @ 50 Ft. from Pavement Edge, 10 A.M. (76±6) ¹	Living Room Music (76) TV-Audio, Vacuum Cleaner (70)	70 dB(A)
70			Cash Register @ 10 Ft. (65-70) ¹ Electric Typewriter @ 10 Ft. (64) ¹ Dishwasher (Rinse) @ 10 Ft. (60) ¹ Conversation (60)	60 dB(A) 1/2 As Loud
60		Air Conditioning Unit @ 100 Ft. (60)		
50	QUIET	Large Transformers @ 100 Ft. (50)		50 dB(A) 1/4 As Loud
40		Bird Calls (44) ¹ Lower Limit, Urban Ambient Sound (40)		40 dB(A) 1/8 As Loud
10	JUST AUDIBLE	[dB(A) Scale Interrupted]		
0	THRESHOLD OF HEARING			

SOURCE: Reproduced from Melville C. Branch and R. Dale Beland, "Outdoor Noise in the Metropolitan Environment", Published by the City of Los Angeles, 1970, p.2.

and 7:00 a.m.) receive a 10 dB weighting. The CNEL is similar to the Ldn except that it includes an additional five dB penalty for events occurring in the evening (7:00 p.m. to 10:00 p.m.).

Intermittent or occasional noise such as that associated with a stationary noise source (e.g., a generator) sometimes is not loud enough to exceed the CNEL or Leq community noise standards. To account for such intermittent noise, acoustical engineers characterize noise in terms of the percent noise level (L%). The percent noise level is the level exceeded "x" percent of the time during the measurement period. For example, in an area where noise levels exceed 65 dB 90 percent of the time, the L90 is 65 dB.

Effects of Noise

Studies have been performed by the U.S. Environmental Protection Agency (EPA) and other public and private organizations to determine the relationship between particular noise levels and human health. The human response to noise has been shown to be varied and complex. Noise effects can be divided into three general categories: 1) physiological effects; 2) behavioral effects; and 3) subjective effects. (A-1)

Physiological Effects - Physiological effects may be temporary or more enduring and permanent. For example, a loud, sudden noise may cause a startled reaction (increased heart rate) or a momentary hearing loss. In the longer term, constant exposure to loud noises may result in a person losing sleep or even experiencing permanent hearing damage.

Behavioral Effects - Behavioral effects involve interference with everyday activities such as conversing, watching television or studying. Loud noises may interrupt the activities or prevent the activities from continuing.

Figure N-1 indicates that normal conversational speech is in the range of 60 to 65 dBA, and noise above that level can interfere with speech, depending on the distance between speakers. A report published by the EPA states that "continuous exposure to noise levels above 90 dBA appear to have potentially detrimental effects on human performance," especially for tasks requiring intense concentration. (A-1, page E-2)

Subjective Effects - Subjective effects represent a combination of physiological and behavioral impacts. By nature subjective effects are most difficult to describe because different people react differently to particular noises. For example, a jet airplane flying overhead may disrupt a conversation between two people and cause momentary hearing loss. One person might term this occurrence as extremely annoying, whereas the other person may find it only a mild nuisance.

Community reaction surveys have found that prolonged noise levels approaching or above 85 dBA generally disturb a community to the point of vigorous community action directed towards reducing or eliminating the noise source. Figure N-2 presents data drawn from community noise surveys which compare community noise levels to the response of the community to those levels.

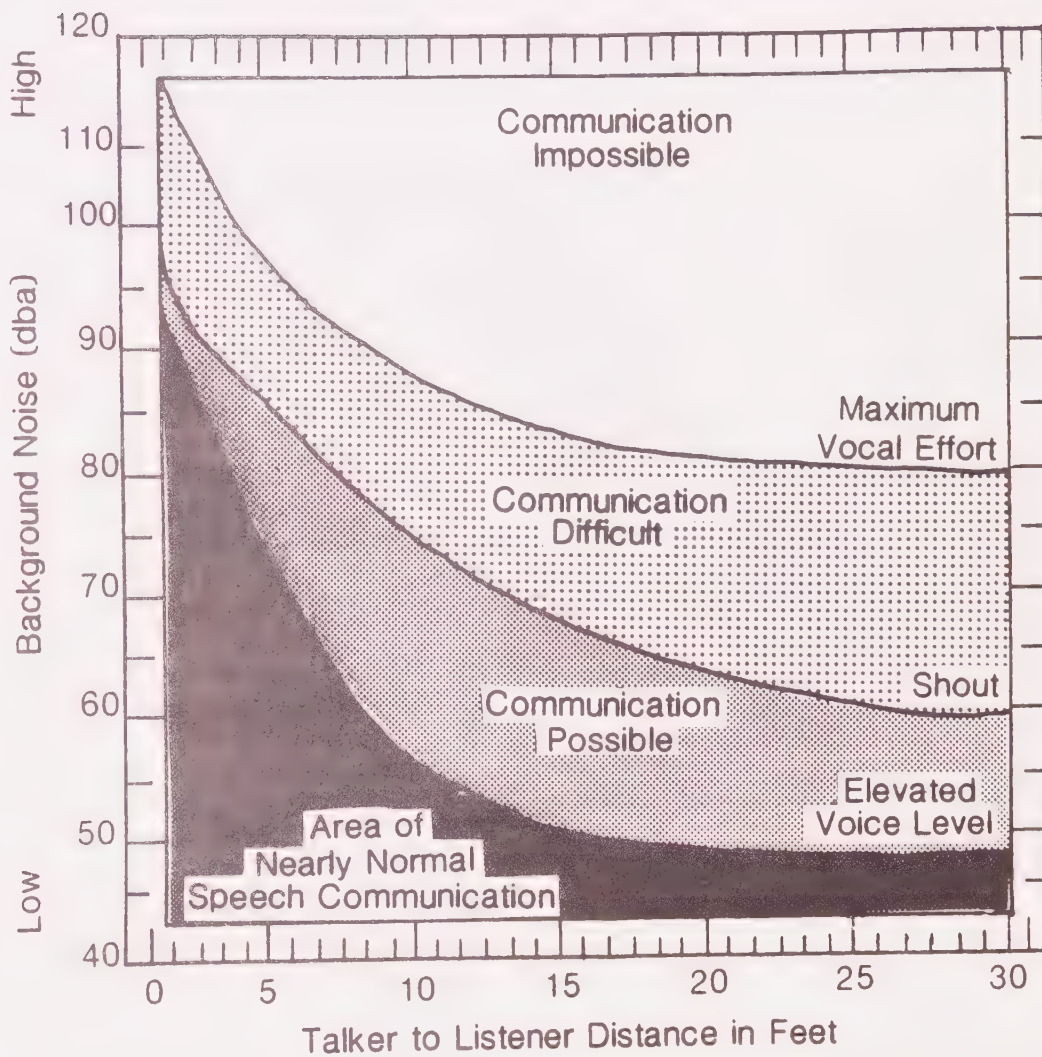


Figure N-1
Effects of Noise on Speech

COMMUNITY REACTION

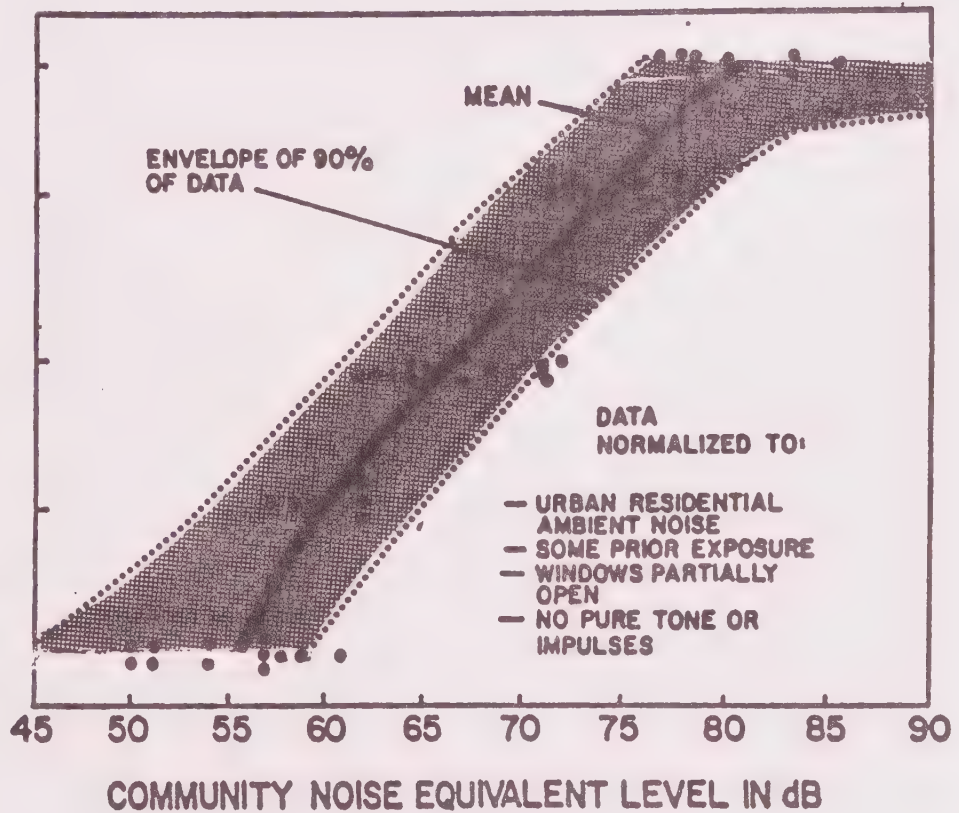
VIGOROUS
COMMUNITY
ACTION

SEVERAL
THREATS
OF LEGAL
ACTION, OR
STRONG
APPEALS
TO LOCAL
OFFICIALS TO
STOP NOISE

WIDESPREAD
COMPLAINTS
OR SINGLE
THREAT OF
LEGAL ACTION

SPORADIC
COMPLAINTS

NO REACTION,
ALTHOUGH
NOISE IS
GENERALLY
NOTICEABLE



3.0 NOISE AND LAND USE COMPATIBILITY GUIDELINES

As indicated in Section 2.0, noise has the potential to affect human health in various ways. Community decision-makers may use available community noise information, therefore, to ensure that a minimum number of people are exposed to potentially harmful noise sources.

To aid decision-makers, several federal and state agencies have established noise/land use compatibility guidelines. These guidelines, described in the following paragraphs and tables, are all based upon cumulative noise criteria such as Leq, CNEL or Ldn.

Environmental Protection Agency (EPA)	<p>In March of 1984, the EPA published a document which for years has served as the primary source of information about noise and its effects on land use and people. The document entitled <u>Information of Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety</u>, contains a table which identifies noise level thresholds requisite for protecting human health in both indoor and outdoor environments. These thresholds and their relationship to specific land uses are indicated in Figure N-3. The thresholds are not considered standards, specifications or regulations.</p>
Federal Highway Administration (FHWA)	<p>The FHWA has adopted and published noise abatement criteria for highway construction projects. The FHWA noise abatement criteria establishes an interior noise goal for residential land uses of 67 Leq. The interior goal for residences is 52 Leq. The criteria apply to private yard areas and assume that typical wood frame houses with open windows provide a 10 dB noise reduction (outdoor to indoor) and a 20 dB noise reduction with the windows closed.</p>
State of California	<p>In 1976, the State Office of Noise Control (Department of Health) published a recommended noise/land use compatibility matrix which many jurisdictions have adopted as a standard in their general plan noise elements. This matrix, reproduced in Figure N-4, indicates that residential land uses and other noise sensitive receptors generally should locate in areas where outdoor ambient noise levels do not exceed 65 to 70 dBA (CNEL or Ldn).</p> <p>This compatibility matrix is not mandatory, only recommended. However, the State Department of Housing and Community Development has established mandatory noise</p>

	Measure	Indoor Activity Inter- ference	Hearing Loss Considera- tion	To Protect Against Both Ef- fects (b)	Outdoor Activity Inter- ference	Hearing Loss Considera- tion	To Protect Against Both Ef- fects (b)
Residential with Out- side Space and Farm Residences	L _{dn}	45		45	55		55
	L _{eq} (24)		70			70	
Residential with No Outside Space	L _{dn}	45		45			
	L _{eq} (24)		70				
Commercial	L _{eq} (24)	(a)	70	70(c)	(a)	70	70(c)
Inside Transportation	L _{eq} (24)	(a)	70	(a)			
Industrial	L _{eq} (24)(d)	(a)	70	70(c)	(a)	70	70(c)
Hospitals	L _{dn}	45	.	45	55		55
	L _{eq} (24)		70			70	
Educational	L _{eq} (24)	45		45	55		55
	L _{eq} (24)(d)		70			70	
Recreational Areas	L _{eq} (24)	(a)	70	70(c)	(a)	70	70(c)
Farm Land and General Unpopulated Land	L _{eq} (24)				(a)	70	70(c)

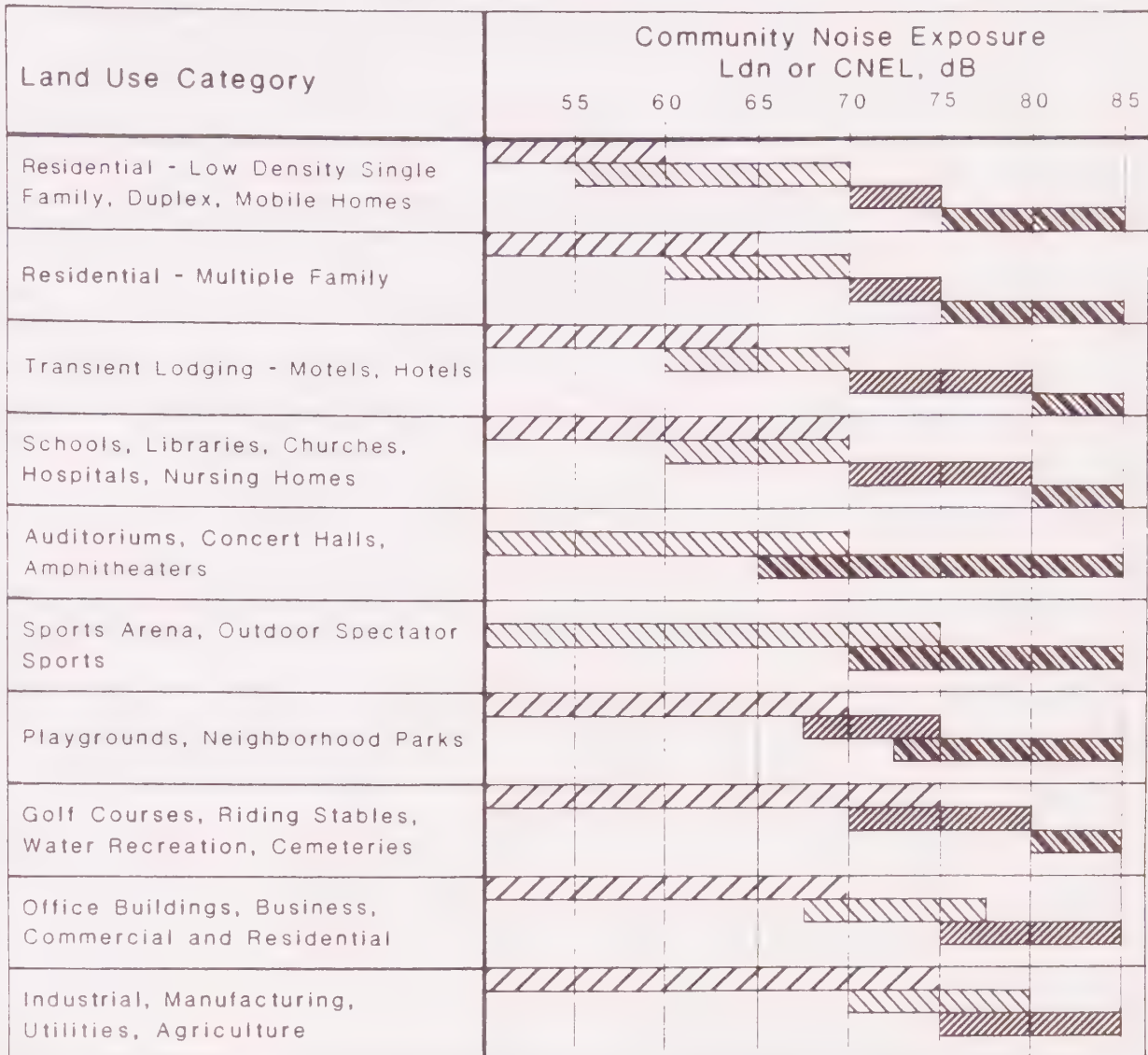
Code:


- Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity. (See Figure D-2 for noise levels as a function of distance which allow satisfactory communication.)
- Based on lowest level.
- Based only on hearing loss.
- An L_{eq}(8) of 75 dB may be identified in these situations so long as the exposure over the remaining 16 hours per day is low enough to result in a negligible contribution to the 24-hour average, i.e., no greater than an L_{eq} of 60 dB.

Note: Explanation of identified level for hearing loss: The exposure period which results in hearing loss at the identified level is a period of 40 years.

*Refers to energy rather than arithmetic averages.

SOURCE: EPA



 Normally Acceptable

Specified Land Use is Satisfactory, Based Upon the Assumption that Any Buildings Involved are of Normal Conventional Construction, Without Any Special Noise Insulation Requirements.

 Conditionally Acceptable

New Construction or Development Should be Undertaken Only After a Detailed Analysis of the Noise Reduction Requirement is Made and Needed Noise Insulation Features Included in the Design. Conventional Construction, but with Closed Windows and Fresh Air Supply Systems or Air Conditioning, Will Normally Suffice.

 Normally Unacceptable

New Construction or Development Should Generally be Discouraged. If New Construction or Development Does Proceed, a Detailed Analysis of the Noise Reduction Requirements Must be Made and Needed Noise Insulation Features Included in the Design.

 Clearly Unacceptable

New Construction or Development Should Generally not be Undertaken.

SOURCE: Guidelines for the Preparation and Content of Noise Elements of the General Plan, California Department of Health, Office of Noise Control, February, 1976.

guidelines for multiple family residential construction. New multiple family units cannot be exposed to outdoor ambient noise levels in excess of 65 dBA (CNEL or Ldn), and sufficient insulation must be provided to reduce interior ambient levels to 45 dBA.

City of Orange Noise Ordinance - The City has a noise ordinance which establishes exterior and interior noise standards for residential neighborhoods. Within designated "noise zones" (all residential properties and adjacent areas), noise standards are as follows:

<u>Area</u>	<u>Noise Level</u>	<u>Time Period</u>
Exterior	55 dBA	7:00 am - 10:00 pm
	50 dBA	10:00 pm - 7:00 am
Interior	55 dBA	7:00 am - 10:00 pm
		10:00 pm - 7:00 am

The noise ordinance indicates that these standards cannot be exceeded as follows: 1) for a cumulative period of more than 30 minutes in any hour; 2) the standard plus 5 dBA for more than 15 minutes in any hour; 3) the standard plus 10 dBA for more than five minutes in any hour; 4) the standard plus 15 dBA for more than one minute in any hour; and 5) the standard plus 20 dBA for any period of time. Certain uses are exempt from these requirements.

4.0 COMMUNITY NOISE ENVIRONMENT STUDY

In October 1987 through January 1988, Mestre-Greve Associates, Acoustical Engineers, measured community noise levels at 29 sites throughout the City. These measurements, plus measurements obtained from other studies in the City, were used to develop a community noise model and noise contour map. The noise contour map depicts the City noise environment as of January 1988.

Methodology

The 32 noise measurement sites were selected based on their proximity to major noise sources (e.g. freeways, industrial activities) and noise sensitive land uses (e.g. residences, schools, hospitals). Figure N-5 indicates the locations of these sites.

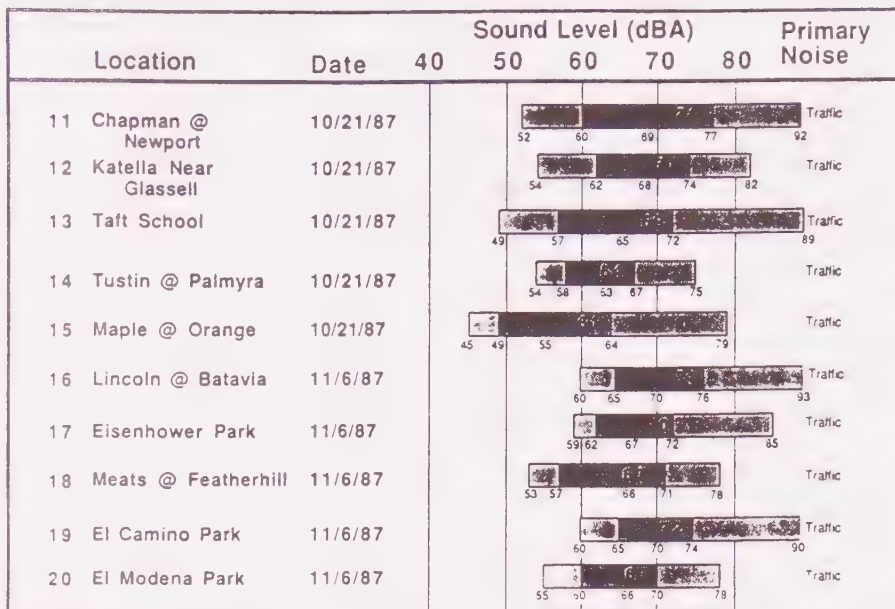
The measurement survey utilized the Bruel & Kjaer 4427 and 2230 automated digital noise data acquisition system. These instruments automatically calculate both the equivalent noise level (Leq) and percent noise level (L%) for any specific time period. The noise monitors were equipped with a Bruel & Kjaer 1/2 inch electret microphone. The system was calibrated with a Bruel & Kjaer calibrator with calibration traceable to the National Bureau of Standards. This measurement system satisfies the ANSI (American National Standards Institute) Standards 1.4 for Type 1 precision noise measurement instrumentation.

The noise measurement program was conducted on five separate days from October 9, 1987, to November 6, 1987, and on January 6, 1988, at 29 locations throughout the City. Three additional measurements were obtained from other studies. The results of the ambient noise measurements at each site are depicted in Figure N-6. These figures also show the date and time of the measurement and the primary noise source affecting the noise environment.

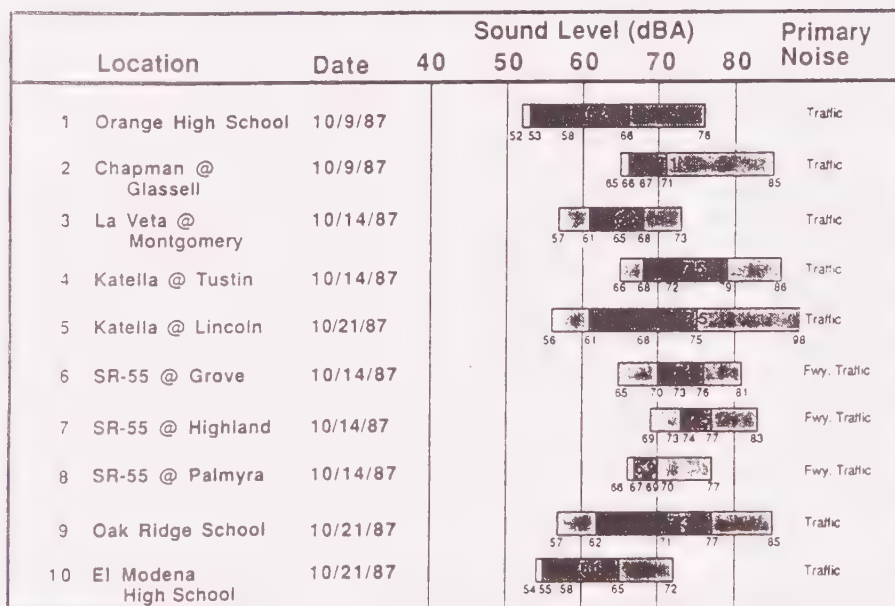
Each site was monitored for a minimum of 20 minutes. Locations near the railroad line or near stationary noise sources where high noise levels occur only occasionally were measured for longer durations. The quantities measured were the equivalent noise level (Leq), the maximum noise level and the percent noise levels (L%). Percent noise levels represent ambient noise levels for given time periods. For example, L90 is the noise level exceeded 90 percent of the time, L50 is the level exceeded 50 percent, and L10 is the level exceeded 10 percent of the time. L90 represents the background or minimum noise level, L50 represents the average noise level, and L10 is the peak, or intrusive, noise level.



Figure N-5
Noise Measurement
Locations

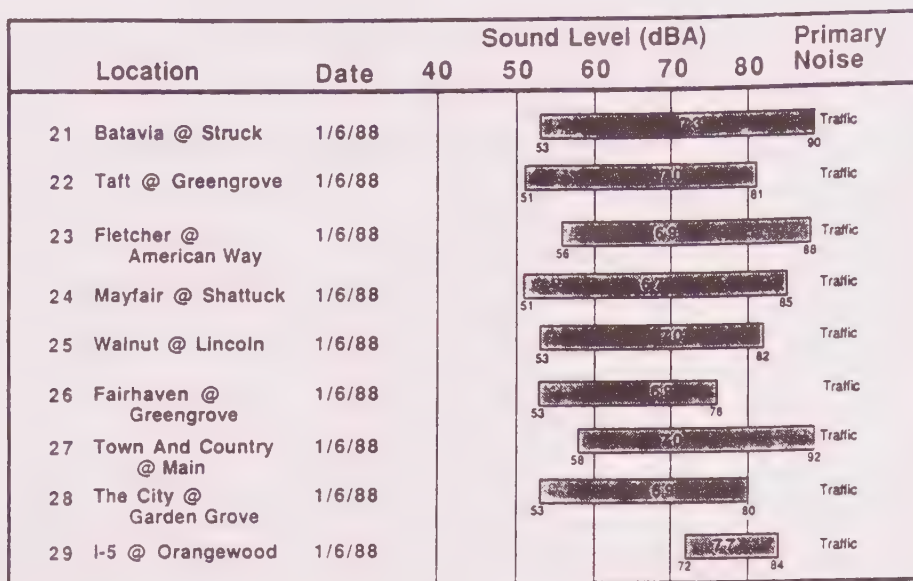


Legend:

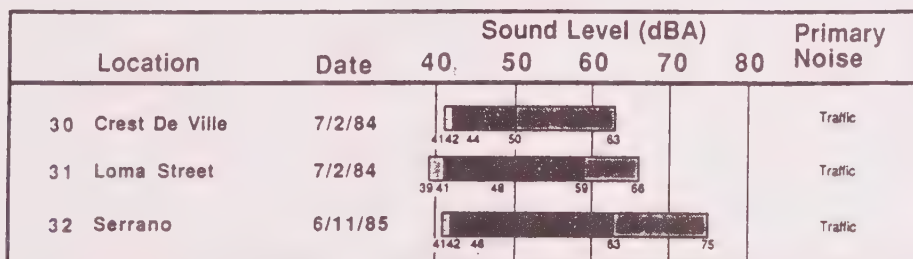
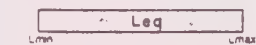


Legend:





Legend:



Legend:



The existing (January 1988) noise levels in Orange were established in terms of the CNEL indices by modeling all of the traffic noise sources for existing traffic volumes and speed characteristics. These results are represented on the noise contour map, Figure N-7. The results for the roadways are also presented in tabularized format in Table N-2. The "Distances to Contours" for the roadways represent the distance from the centerline of the road to the CNEL contour value shown. These tables do not include the mitigating effect of noise barriers or topography. The traffic mix assumptions used in this analysis are shown in Table N-2.

Summary of
Noise
Exposure

Noise sources in Orange fall into five general categories:

- ° Freeways (State Routes 55, 57 and 22, and Interstate 5);
- ° Major and minor arterial roadways;
- ° Aircraft (John Wayne Airport traffic and military traffic);
- ° The Atchison, Topeka and Santa Fe Railroad (AT&SF) line; and
- ° Stationary sources.

Freeways - Four freeways pass through the City. The Costa Mesa Freeway (SR-55) runs in a north/south direction and bisects the City. The freeway is generally at grade with respect to adjacent areas and in general, few sound walls exist. Most of the residential development along the freeway is exposed to noise levels greater than 65 CNEL.

The Santa Ana Freeway (I-5) runs in a northeast/southwest direction through the western portion of the City. In Orange, most of the development along this freeway consists of commercial stores and professional office uses. This freeway impacts only a small portion of the City.

The Orange Freeway (SR-57) is also oriented in a north/south direction in the western portion of the City. The freeway is generally elevated with respect to the adjacent areas. Limited residential development exists along the south portion of the freeway. The closest developments are partially shielded from the freeway by the grading berm of the freeway; however, many of these homes are exposed to noise levels greater than 65 CNEL.

Roadway Name	Link	Distance to Contour (From Roadway Centerline)		
		70 CNEL	65 CNEL	60 CNEL
Lewis St	Lampson/Metropolitan to Chapman	34	73	156
	Chapman to Orangewood	29	62	135
The City Dr	Garden Grove/Memory to Metropolitan	29	63	136
	Metropolitan to Chapman	41	88	190
	Chapman to Orangewood	38	82	176
State College Bl	Orangewood to Katella	60	130	281
Bristol St	Memory to SR-22	72	155	335
Flower St	s/o Memory	11	24	52
Main St	s/o I-5	43	92	199
	n/o I-5	43	92	199
	s/o La Veta	41	88	190
	La Veta to Chapman	28	61	131
	Chapman to Walnut	33	70	152
	Walnut to Collins	28	61	131
	Collins to Katella	27	58	125
	Katella to Taft	22	47	102
	La Veta to Chapman	22	48	103
	Chapman to Walnut	29	62	135
	Walnut to Collins	27	59	127
	Collins to Katella	29	62	135
	Katella to Taft	26	55	119
	Taft to Fletcher	27	59	127
	Fletcher to Lincoln	24	52	111
Grand Av	s/o Santa Clara	37	80	172
Glassell St	Santa Clara to SR-22	45	96	208
	SR-22 to La Veta	51	110	237
	La Veta to Chapman	37	79	170
	Chapman to Walnut	32	69	149
	Walnut to Collins	29	62	135
	Collins to Katella	37	79	170
	Katella to Taft	45	96	208
	Taft to Meats	32	69	149
	Meats to Fletcher	35	76	163
	Fletcher to Lincoln	35	76	163
	Lincoln to SR-91	41	88	189
	SR-91 to La Palma	65	139	300
	Glassell to Lincoln	29	62	135
	Lincoln to Riverdale	22	48	103
	Fairhaven to La Veta	13	28	60
Cambridge St	La Veta to Chapman	18	38	82
	Chapman to Walnut	18	38	82
	Walnut to Collins	16	35	75
	Collins to Katella	16	35	75
	Katella to Taft	19	41	89
	Taft to Meats	16	35	75
	s/o Santa Clara	43	92	199
Tustin St	Santa Clara to Fairhaven	45	96	208
	Fairhaven to SR-22	51	110	237
	SR-22 to La Veta	51	110	237
	La Veta to Chapman	54	116	249
	Chapman to Walnut	52	112	241
	Walnut to Collins	43	92	199
	Collins to Katella	48	102	221
	Katella to Taft	48	102	221
	Taft to Meats	48	104	225
	Meats to Lincoln/Nohl Ranch	50	108	233
	Lincoln/Nohl Ranch to SR-91	27	58	125
	SR-91 to La Palma	45	96	208
	s/o Santa Clara	19	41	89
	Santa Clara to Fairhaven	18	38	82
	Fairhaven to La Veta	18	38	82
Yorba St	La Veta to Chapman	22	47	102

Roadway Name	Link	Distance to Contour (From Roadway Centerline)		
		70 CNEL	65 CNEL	60 CNEL
Prospect Av	s/o Santa Clara	22	48	103
	Santa Clara to Fairhaven	18	39	85
	Fairhaven to La Veta	16	35	75
	La Veta to Chapman	22	48	103
	Chapman to Collins	16	35	75
Wanda Rd	Collins to Katella/Villa Park	19	41	89
	Katella/Villa Park to Taft	32	68	147
	Taft to Meats	22	47	102
Santiago Bl	Meats to Nohl Ranch	23	50	108
	n/o Nohl Ranch	32	68	147
Esplanade Av	s/o Santa Clara	13	28	60
	Santa Clara to Fairhaven	11	24	52
	Fairhaven to La Veta	11	24	52
	La Veta to Chapman	15	32	68
La Palma Av	w/o Kraemer	60	130	281
Riverdale Av	Glassell to Orange-Olive	18	39	85
	Orange-Olive to Tustin	18	39	85
Lincoln Av	e/o Tustin	20	44	94
	w/o SR-57	38	82	176
	SR-57 to Batavia	50	107	231
	Batavia to Glassell	41	88	189
	Glassell to Orange-Olive	45	96	208
Nohl Ranch Rd	Orange-Olive to SR-55	43	94	202
	e/o SR-55	21	44	96
	Batavia to Glassell	9	20	43
	Glassell to Cambridge	18	38	82
	Cambridge to Tustin	22	47	102
Fletcher St	Tustin to Santiago	19	41	89
	e/o Santiago	16	35	75
	State College to SR-57	69	149	321
	SR-57 to Main	72	155	334
	Main to Glassell	34	73	157
Taft Av	Glassell to Cambridge	27	58	125
	Cambridge to Tustin	25	53	114
	Tustin to Wanda/Santiago	22	47	102
	e/o Wanda/Santiago	11	24	52
	State College to SR-57	57	123	264
Katella Av	SR-57 to Main	53	115	248
	Main to Batavia	52	113	243
	Batavia to Glassell	53	115	248
	Glassell to Cambridge	53	115	248
	Cambridge to Tustin	53	115	248
Villa Park Rd	Tustin to SR-55	66	142	305
	SR-55 to Wanda	55	118	254
	e/o Wanda	31	66	142
	Main to Batavia	26	55	119
	Batavia to Glassell	34	73	156
Collins Av	Glassell to Cambridge	29	62	135
	Cambridge to Tustin	34	73	156
	Tustin to Wanda	31	66	142
	Wanda to Prospect	35	76	163
	e/o Prospect	12	25	53
Bond Av	w/o Lewis	11	24	52
Orangewood Av	The City/State College to SR-57	25	53	114
	SR-57 to Main	22	47	102
Walnut Av	Main to Batavia	18	38	82
	Batavia to Glassell	18	38	82
	Glassell to Cambridge	18	38	82
	Cambridge to Tustin	23	50	108
	e/o Prospect	21	44	96

Roadway Name	Link	Distance to Contour (From Roadway Centerline)		
		70 CNEL	65 CNEL	60 CNEL
Chapman Av	w/o Lewis	28	61	131
	Lewis to The City	43	92	199
	The City to SR-57	43	92	199
	SR-57 to Main	40	86	186
	Main to Batavia	33	70	152
	Batavia to Glassell	34	73	157
	Glassell to Cambridge	35	75	162
	Cambridge to Tustin	37	80	172
	Tustin to SR-55	50	108	233
	SR-55 to Yorba	65	140	302
	Yorba to Prospect	54	116	249
	e/o Prospect	50	108	233
	w/o Lewis	16	35	75
	SR-22 to I-5/SR-57	58	125	268
Lampson Av La Veta Av	I-5/SR-57 to Main	29	63	136
	Main to Batavia	36	77	167
	Batavia to Glassell	25	53	114
	Glassell to Cambridge	19	41	89
	Tustin to Yorba	18	38	82
	Yorba to Prospect	15	32	68
	Prospect to Esplanade	13	28	60
	Glassell to Cambridge	29	63	135
	Cambridge to Tustin	31	67	145
	Tustin to Yorba	39	84	181
	Yorba to Prospect	37	80	172
	Prospect to Esplanade	35	76	163
	Glassell to Tustin	24	52	111
	Tustin to Yorba	24	52	111
Fairhaven Av	Yorba to Prospect	20	44	94
	Prospect to Esplanade	12	25	53
	s/o Main	427	920	1982
	Main to SR-57	449	967	2083
Santa Clara Av	SR-57 to The City/State College	398	857	1847
	The City/State College to Katella	391	843	1817
	I-5 to Chapman	361	778	1676
	Chapman to Walnut	375	807	1739
I-5	Walnut to Katella	356	767	1652
	Katella to Ball	344	740	1595
	Ball to Lincoln	347	748	1612
	Lincoln to SR-91	349	752	1620
SR-57	n/o SR-91	432	930	2004
	s/o SR-22	335	721	1554
	SR-22 to Chapman	359	774	1668
	Chapman to Katella	347	748	1612
SR-55	Katella to Lincoln	324	698	1504
	Lincoln to SR-91	333	717	1546
	w/o SR-57	411	885	1908
	SR-57 to Glassell/Kraemer	340	733	1579
SR-91	Glassell/Kraemer to Tustin	324	698	1504
	Tustin to SR-55	313	674	1453
	w/o The City	357	769	1658
	The City to I-5	370	797	1718
SR-22	I-5 to Grand/Glassell	306	660	1421
	Grand/Glassell to SR-55	309	666	1436

	Arterials Percent of ADT			Freeways Percent of ADT		
	Day	Evening	Night	Day	Evening	Night
Automobile	75.51	12.57	9.34	72.54	11.16	9.30
Medium Truck	1.56	0.09	0.19	2.73	0.42	0.38
Heavy Truck	0.64	0.02	0.08	2.73	0.42	0.38

The Garden Grove Freeway (SR-22) runs in an east/west direction through the southern part of the City. The freeway is below grade with respect to the adjacent land uses. Commercial and residential land use occurs north and south of this route. Because the freeway lies well below grade, these uses are not severely impacted by freeway noise.

Major and Minor Arterial Roadways - Traffic noise on surface streets is a significant source of noise within the community. The major roadways in the City include: Lincoln Avenue, Katella Avenue, Chapman Avenue, Glassell Street, Tustin Street, Taft Avenue, Meats Avenue, Walnut Avenue, Main Street, State College Boulevard, Grand Avenue, Prospect Street, Ball Road, La Palma Avenue and Batavia Street.

Noise levels along roadways are affected by a number of traffic characteristics. Most important is the average daily traffic (ADT). Additional factors include the percentage of trucks in the traffic mix, vehicle speed, the time distribution of this traffic and gradient of the roadway.

In general, most of the land use along the major roadways consists of commercial and industrial development. However, multi- and single-family homes are scattered along these roadways, especially in the older, eastern portion of the City. Many of these homes are exposed to noise levels greater than 65 CNEL. New developments in the western portion of the City have sound barriers incorporated into subdivision design.

Aircraft Operations - An additional major source of noise is aircraft noise. John Wayne Airport is located southeast of Orange, and arriving aircraft overfly the eastern portion of the City. Published airport noise studies have shown that the noise contours from these operations are located well outside the City boundary. However, the noise levels during the flyover are sufficient enough that they do result in some single event disturbance.

Private helipads and helicopter flight corridors are also located in and over Orange. Helicopter operations from private facilities have only limited flights, and in-route helicopters generally fly over the City following freeway routes. These events occur only occasionally and are not considered a major noise source of Orange.

However, military helicopters from Tustin MCAS and nearby U.S. Army operations also overfly portions of the City. In particular, the military aircraft fly along the Katella Avenue corridor, disturbing residential and commercial land uses.

Railroads - The AT&SF Railroad Company operates a main railroad line which passes through the southwestern and western portions of Orange. The line enters the City near Anaheim Stadium and proceeds in an eastward direction to Batavia Street. The line parallels Batavia Street, exiting the City below the Garden Grove Freeway. The line is used by Amtrak for passenger service and AT&SF freight trains. Additional railroad spur lines are located in the northwestern portion of the City. The railroad line traverses both residential and commercial properties.

Stationary Sources - Orange has industrial and commercial noise sources at several locations through the City. The larger commercial centers include the Mall of Orange and The City Center. Smaller operations lie along strip commercial zones, and residential land uses in many instances are located behind the commercial development. The primary noise associated with commercial and industrial facilities is automobile traffic and truck traffic making deliveries to these facilities. Additional sources of noise include heavy equipment operation and outdoor loud-speakers. A number of businesses have paging systems that are audible in adjacent residential developments.

5.0 REFERENCES

A. Documents

1. U. S. Environmental Protection Agency, Report on Levels of Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety, March 1974.
2. "City of Orange General Plan Noise Element Technical Appendix," Mestre Greve Associates, January 1988.

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